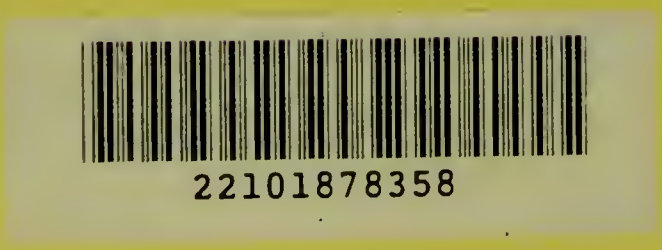
TRANSACTIONS

OF THE

Seventh International Congress

OF

Hygiene & Demography.



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TRANSACTIONS

OF THE

Seventh International Congress of Hygiene and Demography.

London, August 10th–17th, 1891.

Patron:—HER MAJESTY THE QUEEN.

President:—H.R.H. THE PRINCE OF WALES, K.G.

Volume VIII.

SECTION VIII.

NAVAL AND MILITARY HYGIENE.

EDITED BY C. E. SHELLY, M.A., M.D.,
Assisted by the Honorary Secretaries of the Section.

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SECTION VIII.

NAVAL AND MILITARY HYGIENE.

Tuesday, 11th August, 1891.

THE PRESIDENT, The Right Hon. THE LORD WANTAGE, K.C.B., V.C., in the Chair.

Presidential Address.

BY

The Right Hon. THE LORD WANTAGE, K.C.B., V.C.

I feel greatly honoured at being chosen to preside over the Naval and Military Section of what is perhaps the most important Conference that has ever assembled for the purpose of discussing questions connected with the science of public health, and especially such as tend to its preservation and improvement.

In the few words I would now address to you I shall not venture upon any remarks of a scientific or technical nature—my knowledge of the matters under discussion is confined to what I have acquired when taking part in Committees upon army medical subjects, and upon Red Cross work. I shall leave the discussion of such subjects to the abler treatment of those who will follow me in this Conference, and I will confine myself to congratulating you upon the assemblage in London of so large and varied a body of distinguished men, representing not only England and her Colonies, but almost every civilised nation of the globe; and to inviting those around me to give us the benefit of their teaching and experience upon the main question before us, which is how best to maintain in full efficiency the greatest temporal blessing which is accorded to mankind, namely, health both of body and of mind.

I can imagine no worthier field for the practical exercise of that scientific spirit which is the special outcome of our age than that of developing and perfecting the many means which conduce to the maintenance of such a standard of bodily health as shall enable our constantly increasing populations to obtain the greatest amount of working powers from the physical and intellectual qualities with which nature has endowed them.

To the Military Section, over which I have the honour of presiding, these remarks apply with special force. In an army we have a large

body of men, removed from the ordinary conditions of life, and their physical and moral well-being confided to the care of the State. To render their conditions of life so sanitary, both mentally and bodily, as to ensure the full discharge of their military duties, is an object worthy of the life devotion of such men as I see before me to-day. A vast field for improvement of all kind lies before us. But it is not altogether virgin soil that we have to work on. Much has already been achieved, and when we look back and see in past times the disregard that prevailed of the health and comfort of soldiers in barrack life, and the lack of provision for the sick and the wounded in war, and when we attempt to realize in our own minds the amount of suffering and misery which such neglect entailed, we can congratulate ourselves on all that has been done of late years.

But in proportion as knowledge increases, and as the spirit of humanity (which I may call the special virtue of modern Christianity and of modern civilization) expands—so do the requirements of military hygiene and of all it involves increase. This has been fully recognised throughout the civilized world, both by Governments and by peoples. In the United States of America, the provision made for soldiers disabled in the service of their country, is of remarkable efficiency and completeness. In Europe the formation of numerous societies for voluntary aid, which supplements the work done by Government proves how wide-spread and deep-rooted is the conviction that soldiers and sailors have special claims on all that charity and science can do to lighten the trials and sufferings that are a necessity of their calling. England has not been behind other nations, and the English Government has recently given fresh proof of its appreciation of its duties and responsibilities towards the army, by a large Parliamentary grant of money towards the construction of new and improved barracks at Aldershot and at other military centres. Medical men have long realized that sunshine and fresh air are their best sanitary allies, and the new barracks now being constructed by our engineers are built in such a manner as to reap the full benefit of these natural advantages, as well as of recent practical and scientific improvements for artificial warmth and ventilation. On our country rests special and peculiar obligations on account of the large proportion of very young soldiers who (owing to the exigencies of voluntary service and other causes) fill the ranks of our army, and who spend the period of early youth under the control and discipline of military life. That such control should result in the improvement, not the deterioration, of their "physique" is a matter of paramount importance to their efficiency while with the colours, and after their return to civil life. The matter is complicated by the fact that our troops are not confined to home service, but are compelled to serve in every variety of climate. This renders a full study of the diseases incident to tropical and other climates a primary necessity of British Military Hygiene. To these diseases lads and young men fall easier victims than men of more mature age, and hence our troops are found to be specially susceptible to them. In India much has been done, and much more may hereafter be done, both there and elsewhere, by

transference during the hot seasons to hill sanatoriums. The subjects I have thus indicated, and many similar topics, will afford subject matter for far more prolonged discussions than the present week of conference can admit of.

My own active co-operation with members of the Army Medical profession is limited to my work with the "National Aid Society for Sick and Wounded in War." I shall always look back with satisfaction to the time when I was associated with many thoughtful and experienced members of the profession, and had the privilege of working with them, during the great Franco-German War of 1870–1. Relief was rendered to the wounded of both sides on the battlefield and often under fire by devoted men, some of whom I have the pleasure of seeing at this Congress. Surgeons and voluntary workers of all nations united in the great work of humanity, and performed their self-imposed duties regardless of all save the preservation of life and the alleviation of suffering. Women, too, gave their services; and women's work—begun, as regards England, during the Crimean War, and under the direction of that much honoured lady, Florence Nightingale—received a great impetus during the Franco-German War. It has now become a recognized branch of the English Army Medical Service, to the great advantage of the sanitary condition of our army hospitals and of the comfort and happiness of the patients.

These are, however, in some degree retrospective thoughts, and relate mainly to the past. The object of this Congress is not to look back but forward.

It is by the discussions and suggestions in meetings such as these that progress in the future is assured. For practical purposes the work before us is divided into Sections, and each separate Branch of the Congress, having in view the same general end and object, gives its share of aid and assistance in advancing the physical welfare of the community at large.

The Congress of London, so ably inaugurated yesterday by its President, His Royal Highness the Prince of Wales, at the strikingly representative and largely attended meeting held in St. James' Hall, holds out a bright promise of hope that it will largely advance the great cause which its members have at heart.

We all, rich and poor, workers and men of leisure, feel the value of health, though, like many other blessings, we hardly realize its full value until deprived of it. But rarely has this universal feeling been so truly and eloquently expressed as by a well-known writer of the last century, Sterne, in whose words I will ask to be allowed to close these few inaugural remarks:—

"O blessed Health! thou art above all gold and treasure; 'tis thou "who enlargest the soul, and openest all its powers to receive instruc- "tion, and to relish Virtue. He that has thee has little more to wish "for. And he that is so wretched as to want thee, wants everything "with thee."

Modern Quarantine in Canada and in the United States.

BY

FREDERICK MONTIZAMBERT, M.D. Edin., F.R.C.S.E., D.C.L., Medical Superintendent, Canadian Quarantine Service, President American Public Health Association, &c.

The word "quarantine" has been retained in use from habit and for convenience of expression. As applied to our seaboard protective establishments against the introduction of infectious disease from abroad, it has, however, long ceased to imply the idea of a routine time of detention.

"Medical inspection" to detect actual cases of illness; and what is known as "maritime sanitation" to destroy the micro-organisms of disease in vessels, clothing, &c., with, in some cases, the detention under quarantine of observation of "suspects" for a term varying with the period of incubation of the particular disease, constitute the practice covered by the expression "maritime quarantine."

In Canada quarantine is entirely under the National Government. In the United States it is under the various States, and in some cases the seaboard cities. These local quarantine establishments are, however, supplemented by national quarantine or refuge stations. The expectation is that many of the local establishments will come more and more to act merely as inspecting stations, and that vessels requiring treatment will be sent to the nearest national quarantine station.

The details of the appliances in use at our quarantines vary—as may well be expected—to a certain extent, in accordance with the special demands of each port. And these demands are influenced by questions of latitude and climate, by the presence or absence of a large annual immigration through the port, and by the distance of the port from a fully equipped national station.

But the differences are in degree rather than in kind.

There is a general acceptance of steam, the mercuric chloride drench, and fumigation with sulphur dioxide, as our recognised means of disinfection, and the appliances for the use of these several means are adopted more or less fully and completely as the necessities of each particular port may seem to demand.

The main requirements for a quarantine station are held to be as follows:—

1. A boarding station, so placed as to command the channel leading to the port.

2. A boarding steamer, fitted with hospital cabins for landing the sick, and with appliances for disinfecting in the offing ships' hospitals with the mercuric chloride drench, and with steam, when such disinfection is found to be all that the vessel requires.

3. A reserve steamer to replace the usual boarding steamer on emergency, and—where the station is isolated—to act as supply and mail steamer, for the forwarding of convalescents, &c.

4. An anchorage for vessels under quarantine of observation. It should be placed conveniently for the main establishment, and safely remote from the track of commerce.

5. A deep-water pier. The depth of water at low tide at its end should be at least equal to the draught of the largest vessels coming to the port, with a frontage sufficient for such vessels to moor to it if required. Upon this pier there should be constructed—

(*a.*) A warehouse;

(*b.*) Elevated tanks for disinfecting solutions;

(*c.*) A disinfecting house containing steam disinfecting cylinders;

(*d.*) Sulphur furnaces, engine, exhaust fans, &c. for fumigation.

6. A lazarette or hospital for the treatment of infectious diseases.

7. Separate accommodation for non-infectious cases from infected vessels in quarantine.

8. Detention houses for the detention under observation, in groups, of "suspects" or persons who have been exposed to infection.

9. Quarters for officers and staff.

10. Telegraphic communication with the rest of the world. Telephonic communication between the different parts of the station.

11. A bacteriological laboratory.

12. A cremation furnace for the disposal of the bodies of those who have died of infectious disease.

The disinfection appliances may be described somewhat more at length.

Mercuric chloride drench. Upon the pier a framework is erected some 35 or 40 feet high. On top of this is a circular wrought-iron tank, capable of holding about 8,000 gallons. The top of the tank is closed by a secure cover to prevent access of light to the solution. On the top of this cover is placed centrally a wooden cask holding about 60 gallons. In this the mercuric salt is dissolved, and then let down into the tank through a wooden faucet; 65 to 70 pounds of the mercuric chloride are used for one charge. The strength of the solution used being from 1 in 700 to 1 in 1,000. In the tank near the lower edge are three heavy faucets of galvanised iron, to each of which is screwed a lead of one inch four-ply rubber hose. The ends of these lie on the pier, and are lengthened by additional sections to reach any part of the largest vessel. To the far extremity of each hose a nozzle, or a rose for spraying, is attached, provided with a stop-cock. During disinfection all three leads may be used simultaneously, fore, aft, and amidship. On a single vessel from 1,500 to 3,000 gallons may be used in drenching and spraying all attainable surfaces of the vessel excepting cargo, but including ballast, hold, saloons, forecastle, decks, &c. The process requires from half-an-hour to two hours, according to circumstances. The bilge water also is replaced by this solution.

Steam disinfecting cylinders. These chambers, two or three at one station, consist of jacketed, cylindrical shells, made of strong boiler iron, each shell being 40 or 50 feet long and 7 or 8 feet in diameter, inside measurement, and furnished with doors at each end. All clothing,

bedding, hangings, &c., are taken from vessels undergoing maritime sanitation, placed in the cylinders, and allowed to remain for 15 to 20 minutes subjected to a temperature of 230° Fahr. dry and moist heat. A crane is provided for swinging the moveable doors or heads into and out of place. The cylinders are covered with hair-felting and canvas to prevent radiation. The clothing, &c. is hung on trucks with clothes racks; these are admitted at one end and taken out at the other. The steam is admitted into the manifolds from a stationary boiler close at hand. The cylinders are provided with safety valves variously weighted and set, according as steam under-pressure or streaming steam may be preferred. Dry heat is first introduced, raising the temperature to 180° to 190° Fahr.; steam is then turned on, bringing the thermometer up to 230°, at which it is held for some 20 minutes or half-an-hour.

Sulphur dioxide fumigation. Various patterns of furnaces for sulphur fumigation are in use. They are all alike in the principle of driving the sulphur fumes by powerful fans with great power and velocity into the closed holds or apartments of vessels, so as to force the fumes into every cranny and crack. The confined air of the hold having first been expelled, is replaced by an atmosphere surcharged with sulphur dioxide. The fan is run by a special engine. The furnaces are connected to the vessel by a pipe of galvanised iron and asbestos cloth of one foot in diameter. An average of three or four pounds per 1,000 cubic feet is employed, and the fumes are generally kept for 24 hours in the vessel's hold.

One very good form of this furnace is that introduced by Assistant-Surgeon Kinyoun, United States Marine Hospital Service. It is on the principle of a reverberatory furnace, consisting of a series of shelves arranged one above another, each shelf holding a pan of sulphur. A forced draught is kept up by means of a fan-blower connected at the bottom. The draught of air charged from the burning sulphur of each shelf is made to reach and pass over the shelf above by means of apertures made by shortening the shelves alternately at their front and back ends. With an experimental furnace repeated experiments gave Dr. Kinyoun from 14 to 16 per cent. of sulphur dioxyde, temperature 21° centigrade, while burning sulphur in a closed place gave only 6 per cent. at 21° C., *i.e.*, it would not support the combustion of sulphur above that per centage. A more recently modified furnace at Charleston, South Carolina, has given gas testing 18 per cent. sulphur dioxyde.

Quarantinable diseases.—The Canadian regulations have always, since their first promulgation in 1832, included "Asiatic cholera, fever, "small-pox, scarlatina, measles, or any other infectious and dangerous "disease." In some parts of the United States the list is limited to yellow fever, typhus, cholera, and small-pox. At ports, however, where there is immigration, the list is more extensive; thus at Boston it includes also diphtheria, scarlet fever, typhoid fever, and measles; and at New York, with all the above, relapsing fever is also mentioned, "and "any diseases of a contagious, infectious or pestilential character,

"which shall be considered by the health officer dangerous to the "public health." Within the last two years leprosy has been added to the list, both in Canada and the United States; and in the latter country, since the 1st of April last, consumption is classed amongst the dangerous and contagious diseases barring admission, immigrants suffering from it, being now ordered to be returned to the ports from whence they came.

Canada has nine principal quarantine stations, viz., Halifax, Pictou, Hawkesbury, and Sydney, Cape Breton in Nova Scotia; St. John and Miramichi in New Brunswick; Charlottetown in Prince Edward Island; the St. Lawrence Quarantine; and Victoria in British Columbia.

The United States Government has eight national quarantine or refuge stations, viz., Delaware Breakwater, Delaware; Cape Charles, Virginia; Sapelo Sound, Georgia; Key West, Florida; Chandeleur Island, Mississippi; and, on the Pacific, San Diego, California; San Francisco, California; and Port Townsend, Washington.

In addition to these, many ports have well-equipped stations; amongst these may be specially mentioned New York, Charleston, North Carolina, New Orleans, and Galveston, Texas.

For ports that have not organised quarantines the collectors of customs are efficient aids. In the United States they have, by law, the power of search and detention of vessels; and in Canada they are required by law to cause a medical inspection of any suspected vessel before granting a customs entry, and if the presence of infectious disease be discovered, they are empowered to send the vessel to the nearest equipped quarantine station.

The Marine Hospital Bureau at Washington compile and issue an "Abstract of Sanitary Reports" which come to them by mail or cable from all parts of the world. This they kindly furnish weekly to quarantine officers. The prompt information this gives of infectious disease abroad, and the warning of what to specially look for in vessels from foreign ports, are of great importance and value.

In the carrying out of the quarantine administration throughout Canada and the United States, full weight is given to the endeavour to reduce to the minimum, consistent with safety, the interference with the liberty of the individual, and with the financial interests involved. It is recognised that seaboard quarantines cannot be expected to entirely prevent the introduction of all disease from abroad without such detention of all vessels, passengers, and merchandise, and such consequent interference with trade and commerce, as would be injustifiable and impracticable in ordinary circumstances. The necessity for, and vital importance of, state, provincial, and municipal boards of health, with their organised system of notification and isolation we are fully alive to. They form, with our seaboard quarantines, our double line of defence. But, on the other hand, we realise that, almost without exception, epidemic disease has come to our continent by ships, and our seaboard quarantines are held accountable for dealing with actual cases of disease arriving, with infected vessels and effects, and with those

suspected of being infected. By the methods of medical inspection and maritime sanitation that I have thus briefly endeavoured to describe they strain out and protect the country from a very large per-centage, indeed, of the exotic disease which threatens it from time to time, and that without any undue interference with commerce; and they are further capable of more complete and extended action when special circumstances call for it at any particular time and place.

Quarantaine et Inspection Médicale.

PAR

VALENTIN VIGNARD, D.M.P., Ancien Directeur du Service Sanitaire des Bouches du Danube.

La vapeur et l'électricité dominent le monde moderne. Les applications de ces deux agents ont changé du tout au tout les conditions d'existence des peuples. Elles ont fait de la rapidité des communications un besoin vital; elles ont forcé et forceront de plus en plus à abaisser les barrières élevées entre les nations, soit par la nature, soit par les gouvernants.

Au nombre de ces barrières, la moindre n'a pas été l'institution quarantenaire. De l'ancienne quarantaine, je n'ai rien à dire, elle a disparu à peu près complètement et ce qui en reste çà et là ne vaut guères la peine qu'on s'en occuppe; mais elle a laissé derrière elle une trace profondu de son passage. C'est cette influence, plus ou moins cachée de l'ancienne institution qui cause dans le monde des hygiénistes le défaut d'entente qu'on observe chaque fois qu'il s'agit de prophylagie internationale. Les hygiénistes en effet se partagent en deux camps: dans l'un on se déclare en faveur de la quarantaine; dans l'autre, on la remplace par ce qu'on appelle "Inspection médicale."

Ce défaut d'entente est extrêmement fâcheux, car, pour ne rien dire de plus, il jette du discrédit sur les autorités sanitaires et empêche le public d'avoir confiance en des mesures qu'il entend approuver par ceux-ci, condamner par ceux-là. Ne serait-il pas possible de trouver un terrain d'entente sur lequel la conciliation de ces frères ennemis pourrait se faire? Ce serait un grand honneur pour ce congrès de le découvrir, de le bien déterminer et de mettre ainsi fin à des discussions stériles qui n'ont que trop duré.

Que sont donc ces deux systèmes?

Pour fixer les idées, prenons un exemple bien défini. Supposons un navire venant d'un lieu contaminé, après avoir eu des morts pendant la traversée et ayant encor des malades au moment de son arrivée. Voyons comment vont se comporter chacun des systèmes rivaux. Je

n'ai pas besoin d'entrer dans le détail des mesures, il me suffit de les indiquer, ce que je fais de la manière suivante :—

Quarantaine.	*Inspection médicale.*
1°. Arraisonnement du navire : examen médical de l'équipage et passagers.	1°. Id.
2°. Le navire est envoyé au lazaret où il sera soumis au déchargement sanitaire et où, le déchargement terminé, il devra rester en "quarantaine" pendant *tant* de jours.	2°. Le navire est envoyé au lazaret où il sera retenu le temps nécessaire au déchargement sanitaire.
3°. Les malades sont isolés à l'infirmerie.	3°. Id.
4°. Les passagers bien portants sont mis en quarantaine au lazaret pendant *tant* de jours. Pendant le temps, désinfection du linge de corps, de la literie, des vêtements, etc.	4°. Les passagers bien portants sont libres de continuer leur voyage, pourvu qu'ils donnent l'addresse exacte du lieu où ils se rendent et après désinfection des objets susceptibles leur appartenant.
5°. La fin de la quarantaine étant arrivée sans incidents, navir et personnel sont mis en libre pratique.	

On voit au premier coup d'œil que les deux systèmes sont composés des mêmes éléments "isolement" et "désinfection." Ce qui les distingue, c'est la façon de comprendre et d'appliquer les procédés prophylactiques.

Dans la quarantaine, le durée de la séquestration est fixée tout d'abord, et si cette durée ne peut être diminuée, elle peut être augmentée dans certaines éventualités. Le navire, les passagers, les merchandises ont beau avoir été assainis, on les garde pendant tout le temps déterminé au premier moment et dont le durée a été mesurée d'après la connaissance qu'on croit avoir de l'incubation de la maladie. Ce temps écoulé, on met tout le monde en liberté et on n'a pris aucun précaution pour empêcher ce qui peut se produire, si, plus tard, le mal se développe, quand même, sur un des quarantenaires.

Sous le regime de l'inspection médicale, la durée de la séquestration n'est point fixée d'avance ; cette durée n'est point basée sur la notion très incertaine de la durée de l'incubation. Elle n'est imposée que pour le temps nécessaire—strictement—à l'assainissement du navire et des effets suspects, ainsi qu'à la guérison des malades. Cette durée est donc en rapport direct avec le degré de nos connaissances touchant la désinfection.

Voilà une première différence entre la quarantaine et l'inspection médicale, différence tout à l'avantage de cette dernière : mais il y en a d'autres d'une plus grande portée.

En laissant libres immédiatement les personnes saines, afin de donner satisfaction au besoin, de plus en plus impérieux, de rapidité dans les communications, l'inspection médicale n'a point perdu de vue qu'elle ouvrait par là la porte à des contaminations postérieures possibles. C'est pour y obvier qu'elle prescrit de suivre les personnes libérées jusqu'au lieu de leur destination, qu'elle les surveille pendant un certain temps afin de prendre les mesures convenables au moindre signe suspect. Cela est devenu possible et même facile et il est à remarquer que ce sont précisément les agents qui, après nous avoir forcés de renoncer à l'ancien système, nous fournissent les moyens d'appliquer le nouveau avec succès. Un voyageur, en effet, grâce à la vapeur et à l'électricité, échappe à la quarantaine ; mais il n'échappe pas à l'inspection médicale grâce à cette même vapeur et cette même électricité.

Il est une autre conséquence, extrêmement importante, de l'inspection médicale ; dans ce système, un voyageur, sain à l'arrivée, peut être atteint de la maladie redoutée après être rendu à destination. On prend, il est vrai, toutes les mesures nécessaires pour empêcher la contagion. Mais il est certain que, si la localité où se trouve le malade est malsaine, si, par conséquent, elle offre de trop bonnes conditions mésologiques au développement du mal, celui-ci pourra plus facilement résister aux mesures prescrites. D'où découle, après la nécessité de prendre ces mesures, celle de veiller à l'assainissement de la localité elle-même. Et c'est ce qui, selon moi, donne à l'inspection médicale une importance sociologique de premier ordre. Elle porte, en effet, au plus haut degré la notion d'assainissement ; elle amène logiquement avec elle l'assainissement général du pays.

En méditant sur ce sujet, on se demande pourquoi les hygiénistes se sont divisés en deux camps. Comme je le faisais remarquer plus haut, les deux systèmes sont formés des mêmes éléments ; ils ne diffèrent, en apparence du moins, que par le dosage de ces éléments.

Je dis : en apparence. En allant au fond des choses, on comprend mieux la véritable raison de ce manque d'entente. C'est que les deux systèmes sont rendus distincts par l'idée qui les inspire. Leur esprit est différent. Dans la quarantaine, c'est l'esprit d'isolement qui domine ; dans l'inspection médicale, c'est l'esprit de désinfection, d'assainissement, qui inspire toutes les décisions.

En vérité, y a-t-il lieu de prendre parti, de se déclarer pour l'un ou pour l'autre des deux systèmes ? Je n'en crois rien pour ma part, et je ne fais pas difficulté d'avouer que je les accepte tous les deux. Il n'y a entre eux aucune contradiction. Il suffit, pour s'en persuader, de se rappeler qu'en matière de sciences d'application, il n'y a pas *une* façon d'agir, il y en a une infinité ; car, en chaque cas, il faut prendre les mesures appropriées spécialement à ce cas. Or tous les hygiénistes savent ou devraient savoir qu'il y a des cas où la quarantaine, voire l'ancienne avec toutes ses rigueurs, est seule applicable, tandis que, dans d'autres circonstances, l'inspection médicale rendra des services plus parfaits ; qu'enfin il y a souvent lieu de les combiner dans des proportions variées.

Décider ce qu'il faut faire en un cas donné est une question d'appréciation qui doit se renouveler pour chaque cas et dont la solution variera dans le temps et dans l'espace.

Ici je reviens à ce que je disais plus haut de l'esprit qui régit les deux systèmes. Il est évident que pour prendre la décision la plus juste, la plus conforme aux besoins, il est indispensable que les hygiénistes ne se déclarent plus partisans exclusifs de l'un ou de l'autre système. Cela ne suffit pas. Il faut davantage : il faut que la notion de *désinfection* prenne, dans leurs préoccupations, le pas sur la notion *d'isolement* : les progrès en prophylaxie sanitaire internationale sont à ce prix.

On reconnaitra que le changement souhaité s'est produit, lorsque le mot *quarantaine* aura disparu du vocabulaire des autorités sanitaires. On pourrait discuter cette assertion et se demander quel intérêt il peut y avoir à changer un nom connu depuis des siècles et à le remplacer par une appellation nouvelle. Je suis, pour ma part, persuadé qu'il y a, à cette modification, un intérêt très grand.

Le mot *quarantaine*, représente contradiction séculaire, un ensemble de mesures qui ont pu avoir leur utilité, qui peuvent l'avoir encore, mais qui ne sont plus que très rarement applicables et qui doivent le devenir de moins en moins, car elles sont en opposition avec les besoins les plus pressants de notre civilisation. L'esprit qui dirige les institutions prophylactiques contemporaines doit se modifier en même temps que les conditions des relations internationales. À une chose nouvelle, il faut un nom nouveau, sous peine de s'exposer à des confusions perpétuelles. Le public pour lequel l'expression : *quarantaine*, représente quelque chose de bien defini, ne sera convaincu que l'orientation des autorités sanitaires a changée que s'il les entend de servir d'une appellation nouvelle. Les mots ont leur puissance : *Nomina, numina.*

Il n'est pas besoin de nouveaux raissonnements pour que l'on comprenne que, dans le but de réaliser les désires exprimés dans cette note, la chose la plus urgent est la connaissance de moyens de désinfection surs et rapides. Je ne me suis pas proposé d'aborder la question de la désinfection : il me suffira de dire qu'elle ne pourra être résolue pour les navires comme pour le reste, que par des expériences sévèrement conduites sur une grande échelle et que cette solution est presque la condition *sine qua non* de l'adoption générale de l'inspection médicale par les autorités sanitaires.

Je résume ces quelques lignes dans les propositions suivantes :—

1° Il n'y a pas contradiction entre la quarantaine et l'inspection médicale, qui toutes deux, sont composées des mêmes éléments : isolement et désinfection.

2° Ces deux systèmes ne sont différenciés que par le dosage de leurs éléments. Dans la quarantaine, l'esprit d'isolement domine, dans l'inspection médicale, l'esprit de désinfection.

3° Ces deux systèmes devraient se fondre en un seul, inspiré par l'esprit de désinfection et dont les variétés, allant de la quarantaine ancienne à l'inspection médicale pure, seraient appliquées suivant les circonstances.

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4° Le mot *quarantaine*, impliquant un ensemble traditionnel de mesures où l'idée d'isolement domine, devrait être abandonné par les autorités sanitaires.

5° Des expériences sérieuses devraient être instituées scientifiquement pour trouver des moyens de désinfection surs et rapides pour assainir les navires, contenant et contenu.

The Medical Supervision of the Mercantile Marine.

BY

J. Stopford Taylor, M.D., Medical Officer of Health for the City and Port of Liverpool.

The few observations I am about to present to this meeting will refer more particularly to the port of Liverpool, with which I have been connected for many years, and will apply to the system, or rather want of system, in the medical supervision of the mercantile marine; and I trust that my remarks will not be thought in any way reflecting upon gentlemen who discharge the various duties they are called upon to perform in an able and satisfactory manner, so far as their separate and isolated position will permit.

In an old country, where regulations have been made to meet the requirements and necessities of a growing population and extended communications with other countries, it must naturally be expected that some of them will become obsolete, will not answer the purpose for which they were intended, and—if not in opposition—certainly do not work harmoniously with others; and it is with the view of obtaining a more efficient system by the consolidation of the powers of the various authorities that I have been induced to trespass upon your time with this paper.

All emigrants are examined on embarkation by doctors appointed by the Board of Trade. The Customs appoint a quarantine officer to visit all inward bound ships on which there is infectious disease, and there is the medical officer of health of the Port Sanitary Authority, who acts under the authority of the Local Government Board.

The importance of the emigration trade as a support of the shipping interest and the welfare of the port, is deserving of every consideration; but whilst looking at it from a commercial point of view we must not be oblivious of the responsibilities attaching to it, as well to the emigrants themselves as to the inhabitants of the countries to which they are being taken. On an average, above 200,000 emigrants sail from Liverpool annually, the greatest number generally leaving in April, May, August, and September. As many as 2,000 or 3,000 will occasionally sail on one day. These people are medically inspected as they board the ships, and should any of them appear unwell they

are carefully examined, and if necessary rejected. The result of these inspections is communicated to the Board of Trade: but no report is sent to the Port Sanitary Authority on the subject, and it is only by accident that the medical officer of health learns that cases of infectious disease have been detected. It has occurred that patients suffering from smallpox and scarlatina have been re-landed on the stage amongst a crowd of people and taken to lodging-houses, and in some few instances have taken their departure by train, and returned home.

This system is not at all satisfactory; the emigrants ought to be examined in a properly appointed place before going on shipboard. When the emigrants spend a day or two in the lodging-houses they are visited by doctors engaged for the purpose by the shipping companies; but to lessen expense many emigrants are taken direct to the ships on their arrival by train.

The introduction of so many strangers into Liverpool has led to outbreaks of cholera, smallpox, relapsing fever, &c. in the city, and it is most essential that the existence of infectious disease amongst emigrants should be ascertained as soon as possible, and communicated at once to the health authorities. Further, it is necessary for the safety of the emigrants themselves, that only those in health should be taken on board ship, as it is impossible for the one doctor to supervise 800 or 1,000 people, the majority of whom may be suffering from the discomforts of a voyage.

Whatever sickness occurs on the outward passage of an emigrant ship is not reported to the health authorities, and only cases of sickness existing at the time of the vessel's return are reported through the Customs. For want of this information the conditions on shipboard are concealed, and much mischief may ensue; very recently several outbreaks of diptheria occurred on one of the large steamers, and no information was given by the ship's doctor or the owners, and the medical officer of health only learnt the fact by hearing from the United States that passengers suffering from the disease had been placed in quarantine. No doubt, returns are made to the shipping companies, but they are private, and not available by the health authorities.

The emigration doctors have many duties to discharge, besides those already mentioned, in accordance with the regulations of the Board of Trade, viz., to see that the sanitary conveniences are satisfactory, that there is no overcrowding of passengers or crew, that no nuisances exist, &c. Most of these matters are by the Public Health Act of 1875 subject to the Port Sanitary Authority; for Section 110 states "That any ship or vessel lying in any river, harbour, or other "water, within the district of a local authority, shall be subject to the "jurisdiction of that authority in the same manner as if it were a house "within such district."

We now come to an important consideration which has not only a local but a general interest, and is variously looked upon by different countries. So far as England is concerned, we may say that quarantine

is abolished, for, though the Quarantine Act of 1825 exists, it is never enforced, except in the case of yellow fever. Quarantine stations, once so numerous around our coast, have been swept away, with lazarettos and their expensive establishments; no pest houses, airing hulks or fumigating apparatus exist: they have disappeared and are not missed. To satisfy the fears of the timid and gratify the admirers of old customs two or three disused men-of-war are moored at the Mothertank, off the Isle of Wight, with a staff of well-trained officers and men to deal with any vessel ordered by Her Majesty's Government to be placed in quarantine. In Liverpool we have a quarantine officer appointed by the Customs authority to carry out the Quarantine Act: and, by a general order of that body, he is instructed to visit all ships arriving with infectious disease on board (except cholera), and should the disease be plague or yellow fever, he is to place them in quarantine; in the case of the other infectious diseases, the Customs officer is directed to communicate the fact to the medical officer of health, who then takes charge of the patients and ship. Some few years ago a vessel was put in quarantine in the Mersey, because some cases of yellow fever had occurred on board during her homeward passage; and after being detained several days, application had to be made to the Port Sanitary Authority to take charge of the ship before the Privy Council could release her.

The Privy Council have power reserved to them under the old Quarantine Act, which is re-enacted by the Public Health Act of 1875, to deal with every form of infectious disease, as the Act states "that "every vessel having on board any person affected with a dangerous "or infectious disease shall be deemed to be within the provisions of "the Act of the Sixth year of King George the Fourth, Chapter 78, "although such vessel has not commenced her voyage, or has come "from, or is bound for, some place in the United Kingdom." Excluding cholera ships, which by a special order of the Local Government Board, are placed under the control of the medical officer of health, all other infected ships are to be visited by the Customs medical officer, and are liable to quarantine. By the Act 39 and 40 of Victoria ch. 36, sect. 234, the Privy Council may from time to time require that no person shall land from a ship coming from a place infected with yellow fever, or other infectious disease, until the officers of the Customs have examined into the state of health of the persons on board, and given permission to land, any person being liable to a penalty of 100*l.* for disobedience.

These powers of the Customs, acting under the authority of the Privy Council, are in a measure antagonistic, and opposed to the satisfactory working of the Port Sanitary Authority. Section 110 of the Public Health Act, 1875, as amended by the Public Health (Ships') Act, 1885, gives every power to the local authority to deal with infected ships. The section as amended reads as follows, "For the purposes of "the provisions of this Act relating to nuisances, and also for the "purposes of the provisions of this Act relating to infectious diseases "and hospitals as are contained in sections 120, 121, &c., &c. Any

" ship or vessel lying in any river, harbour, or other water within the " district of a local authority, shall be subject to the jurisdiction of that " authority in the same manner as if it were a house within such " district: and any ship or vessel lying in any river, harbour, or other " water within the district of a local authority shall be deemed to be " within the district of such local authority, as may be prescribed " by the Local Government Board: and where no local authority has " been prescribed, then of the local authority whose district nearest " adjoins the place where such ship or vessel is lying. The master or " other officer in charge of such ship or vessel shall be deemed for the " purpose of the said provisions to be the occupier of such ship or " vessel."

By this section, the Port Sanitary Authority has equal power with the quarantine officer in dealing with infectious disease on board vessels, excepting that of placing them in quarantine. They can direct the cleansing and disinfection of any ship or any part of it, or of any articles likely to retain infection, so as to check or prevent infectious disease; they may direct the destruction of any bedding, clothing, or other articles, which have been exposed to infection from any dangerous infectious disorder, and may give compensation for the same; they may remove to hospital any person who is suffering from any dangerous infectious disorder and is on board any ship or vessel, provided the patient is willing to be removed; should the patient object, an order can be obtained on the certificate of the medical officer of health from any justice for his compulsory removal, and any person who wilfully disobeys or obstructs the execution of such order is liable to a penalty not exceeding 20*l.*; they may make regulations for the removal and keeping in hospital, as long as may be necessary, of any person, brought within their district by ship or boat, who is infected with a dangerous infectious disorder. These powers are sufficient to deal with the ordinary infectious diseases, small-pox, scarlatina, measles, &c., where it is not necessary to detain a vessel; but with cholera other powers are required, which the Local Government Board have conferred on Port Sanitary Authorities by an Order dated 28th August 1890, which re-affirms the provisions contained in previous Orders.

By this Order, if an officer of the Customs ascertains from the master of a ship, or has reason to suspect that a ship is infected with cholera, he shall detain such ship, and order the master to anchor or moor the same in such position as he directs. While such ship is so detained no person shall leave the same. The officer of Customs detaining the ship shall forthwith give notice to the sanitary authority, and his detention of the ship shall not cease until it has been visited and examined by the medical officer of health, unless the examination be not commenced within 12 hours after notice given to the sanitary authority. The medical officer of health if he have reason to believe that any ship within the district of his sanitary authority, whether examined by the Customs officer or not, is infected with cholera, or shall have come from some place infected with cholera, shall visit and examine

such ship, and give a certificate stating whether the ship is or is not infected with the disease. The master of a ship certified to be infected with cholera shall anchor or moor it at the place appointed by the sanitary authority and the chief officer of the Customs. The medical officer of health shall examine every person on board, and in the case of any person suffering from cholera or from any illness which the medical officer suspects may prove to be cholera, shall certify accordingly; and any person not so certified shall be permitted to land immediately on giving to the medical officer of health his name and place of destination, stating, where practicable, his address at such place, and the name and address of such person shall forthwith be transmitted by the clerk of the sanitary authority to the local authority of the district in which the place of destination of such person is situate.

Every person certified by the medical officer of health to be suffering from cholera shall be removed, if his condition permit of it, to some hospital; and no person so removed shall leave such hospital until the medical officer of health shall have certified that such person is free from the said disease. If the person suffering from cholera cannot be removed, the ship shall remain subject, for the purpose of this Order, to the control of the medical officer of health, and the infected person shall not be removed from or leave the ship, except with the consent in writing of the medical officer of health. Any person certified to be suffering from illness, which the medical officer of health suspects may prove to be cholera, may either be detained on board ship, or taken to some hospital and detained two days to ascertain whether the disease is cholera or not. The medical officer is further instructed to give such directions and take such steps as may be necessary to prevent the spread of infection, such as the disposal of dead bodies, the destruction or disinfection of clothing, the disinfection of the ship, &c. The above is an epitome of the Order of 1890, but Orders of a somewhat similar character were previously made, and under these a number of cholera ships were treated, more particularly during the prevalence of cholera in Marseilles and the neighbourhood in 1884, when several vessels having and having had cholera on board arrived in the Mersey. Since then, vessels have arrived from infected ports in Spain and France and have been medically examined, and in no single instance has a case of cholera occurred among the passengers who were permitted to land, or among the inhabitants of Liverpool. The powers of the Order were amply sufficient, and secured the object of relieving the sick and of preventing the extension of the disease. Far different was the state of things in 1866, when cholera ships were treated under the Quarantine Act. I had then the sad experience of seeing the sufferings of the sick and the spread of disease, thus affording a striking contrast between the old and the new systems, and presenting the most positive evidence of the great advance of sanitary knowledge.

If a disease like cholera can be controlled by medical inspection, why not apply the same regulations to ships infected with yellow fever? From my long experience in dealing with infectious disease on land and ships, I am quite satisfied that similar provisions applied to yellow fever

ships would be equally successful and more likely to prevent the introduction and spread of disease than keeping the healthy and the sick together in quarantine.

In conclusion I would suggest that all sanitary and medical matters appertaining to ships should be placed under the control and management of Port Sanitary Authorities, acting under the direction of the Local Government Board; that the medical inspectors of emigrants and emigration ships should be officers of the Port Sanitary Authorities and not of the Board of Trade; that the ships' doctors should report to the Port Sanitary Authority all cases of sickness occurring on shipboard, both on the outward as well as on the homeward voyage; that the Quarantine Act should be repealed, and if it be thought necessary to retain any of its powers, let them be transferred to the Local Government Board; that the name of quarantine doctor be abolished, as the term is misleading, and that, instead of being a Customs officer, he should be transferred to the Port Sanitary Authority as a medical inspector to board all vessels having infectious disease on board; being armed with full powers, he could detain vessels if infected with cholera or yellow fever, and could carry out the various regulations applicable to each case; and for the ordinary cases of infectious disease could order their removal to hospital, and the necessary disinfection and cleansing of the ships.

DISCUSSION.

Dr. Bérenger Féraud (Directeur du service de Santé de la Marine française):—Messieurs, Je ne comptais pas prendre la parole sur la question des quarantaines; mais je crois devoir le faire en présence de l'intéressante communication de M. le Dr. Vignard, pour éviter tout malentendu au sujet de ce point important de l'hygiène internationale. Je désire bien souligner que les opinions de M. Vignard lui sont absolument personnelles.

La question des maladies transmissibles par importation est extrêmement importante. Elle a besoin d'être envisagée dans son ensemble, sous peine, si l'on n'étudie qu'un de ses détails, de ne pas arriver à un résultat efficace. Il ne faut pas oublier dans cette question, que si *time is money*, la vie humaine est le capital de cette monnaie. Dans un Congrès qui se tient dans la Métropole de la plus grande nation maritime et commerciale de l'Europe, je suis certain que je réponds à l'opinion de tous, en disant: qu'avant tout et surtout le bût à atteindre par l'hygiène est de préserver le mieux possible l'existence humaine. Une minute, une jour, une semaine ont peu d'importance quand il s'agit de la vie des masses.

La France, malgré qu'elle conserve le mot de *quarantaine* dans son vocabulaire sanitaire, ne reste pas endormie dans les antiques habitudes des siècles passés. Elle vient de donner, en 1890, un exemple frappant de sa sollicitude et de son esprit de progrès, au sujet du choléra d'Espagne. Les admirables résultats qu'elle a obtenus avec son système sanitaire ont

montré au mondo entier qu'avec ses mesuros et ses règlements sagement compris, elle pouvait préserver sa population de l'invasion d'une maladie qui avait la réputation jusqu'ici do se jouer dcs obstacles qu'on essayait de lui opposer.

On pourrait penser d'après la communication de M. Vignard, qu'en Francc le mot quarantaine implique une durée de séquestration longue et uniforme, ne pouvant être abrégée dans aucun cas. Nous avons tous les jours la preuve du contraire. Lorsqu'un navire arrive contaminé dans nos ports, il est placé dans les conditions nécessaires pour ne pas être un danger pour la santé publique; et, à chaque instant, le temps de sa séquestration varie. Ce temps est toujours borné à l'extrèmo limite minimum qu'impose la prudence.

Messieurs, en présence des résultats obtennus, n'avons-nous pas le droit de dire que nous faisons aussi bien qu'on peut le faire dans eette science d'hygiène préservatriee qui progresse tous les jours ?

Dans une question aussi importante il faut, ai-je avancé tout-à-l'heure, voir l'ensemble et ne pas se laisser entraîner à n'cnvisager que des détails incomplets. C'est pour cela que jc pcnse, pour ma part, que la communication de M. Vignard, toute intéressante qu'elle soit, ne s'occupe que d'une partie de la question; j'estime que ce n'est pas là la voie qui mènera à la solution du problème.

Dans la Conférence tenue à Romc les médecins de l'Inde, réconnaissant l'extrême importance qu'il y a pour l'Europe à impêcher l'importation du choléra par les pélerins musulmans, ont promis d'étudier et d'appliquer l'ensemble des moyens nécessaires à la préservation de nos contrées à l'égard de cette maladie. Il faut examiner avee soin les résultats qu'ils ont obtenus jusqu'ici, pour déeider quelque chose à ce sujet.

D'ailleurs, Messieurs, ce n'est pas en quelques heures, et dans un Congrès qui envisage les questions d'une manière générale, qu'on peut espérer dire le dernier mot dans une affaire de cette importance.

Par conséquent tout en ayant écouté la communication de M.Vignard avec grand intérêt, je crois qu'on ne doit y voir qu'une appréciation purement personnelle.

Si on voulait aller plus avant dans l'étude de cette question, ce serait à une Commission internationale composée des autorités scientifiques et officielles en matière d'hygiène, à ètudier ce grand et important sujet. Car, ne nous y trompons pas, Messieurs, ce n'est pas avec ee qu'a dit M. Vignard, tout intéressante que soit sa communication, que nous pourrions décider ici, *à priori*, ce qui sera la vraie solution.

Cette solution résultera, je le repète, de l'étude et de la discussion de tous les détails. Toute autre manière dc procéder n'arrivcrait pas au bût que nous cherchons tous ici :—*Chercher à sauvegarder au mieux possible, la vie des masses d'hommes dont les hygiénistes ont l'honneur d'avoir la charge à quelque pays qu'ils appartiennent.*

Dr. Henry E. Armstrong, (Medical Officer of Health, Newcastle-upon-Tyne and River Tyne Port; President of the Socicty of Medical Officers of Health,) expressed his regret that the system at Liverpool as describcd by Dr. Taylor was allowed to cxist. As shown by the distinguishcd French minister who had just spoken, and also by M. Vignard in his ablc paper, the word "quarantine" in its original sense was ancient and obsolete. Why then continue it either in that or any modified sense, especially since arrangements prcscribcd by the Local Government Board were, in the speaker's view, amply sufficiont for all emergencies? As medical officer of health of cighteen ycars' standing to tho City of New-

castle-upon-Tyne, where all the principles of sanitary supervision were minutely carried out, the speaker had the fullest and most implicit confidence in the efficacy of the arrangements on shore in operation for the prevention of infectious disease; and he was equally confident that the corresponding arrangements afloat were all that was necessary. The conflict of authority with regard to inquiry as to cholera on shipboard between the Board of Trade and the Local Government Board was much to be regretted. A few years ago the speaker had personal experience of this conflict, as follows:—

A few years ago the Assistant Medical Officer of Health on the River Tyne Port had, acting under the order of the Local Government Board, boarded a vessel arriving from a cholera infected port.

The crew were and had been quite free from disease, but the ship had not a clean bill of health. The assistant, after completing his examination, left the ship as he was authorised to do under the order above named. Soon afterwards the speaker, as medical officer of health of the port, received a letter from the Board of Trade informing him that his assistant had been guilty of a breach of the Quarantine Act. The medical officer of health applied to the Local Government Board for advice as to his duty in a future similar case, but, as might have been expected, had not received any definite instruction on this point. Since, as stated by M. Vignard, steam and electricity had completely altered all the conditions, the speaker considered that quarantine should now be abolished altogether. In conclusion the speaker gave his entire support to the views expressed in the concluding paragraph of the paper by Dr. Stopford Taylor.

Dr. J. Wright Mason, (Medical Officer of Health, Hull,) spoke in reference to the inspection of emigrants arriving at the Port of Hull, numbering from 40,000 to 50,000 annually, viâ Liverpool for America, and the precautionary measures adopted. The port authority were in complete telegraphic communication with the pilots' boarding station at Spurn, and any illness, however slight, on any ship is telegraphed. There was an inspection of all ships arriving at the port, the emigrants being inspected both on their arrival and departure. A port hospital with all modern appliances had been established in Hull, where they had no Customs or Board of Trade inspection as in Liverpool. He was of opinion that the medical inspection should also be vested in the port sanitary authority.

Dr. Alfred E. Harris, (Medical Officer of Health, Town and Port of Sunderland,) said that the English Government should make such arrangements with their consuls abroad that immediate information should be forwarded to the Local Government Board by telegraph of the existence of infectious disease, and that they should distribute such information to the various port authorities of the country, so that they would be enabled to watch vessels coming from these ports more closely than is done at present. Instance was given of an outbreak of small-pox among persons who had landed from a ship coming from a Spanish port, which would have been prevented by a medical examination of the crew on entering the port, such as would have undoubtedly taken place if the speaker had known of the existence of small-pox at the port of departure of the vessel.

Colonel Alfred A. Woodhull (Lieut.-Colonel, Medical Department, U.S. Army), referring to the desire of the last speaker that local officers might be notified of the approach of infected vessels, said that

such a system is practically in force in the United States. The United States consuls at maritime places telegraph to the Washington Government the name of the ship and the character of the disease believed to be carried—of course, serious or infectious diseases—which information is immediately communicated to the health officer of the port of destination. What is thus done in the United States it would appear might readily be accomplished by a country having such wide commercial relations as Great Britain.

Sanitation Afloat.

BY

R. W. Coppinger, M.D., M.Ch., R.N.

The chief difficulty in regard to the provision of suitable accommodation for the crew of a man-of-war consists in the fact that while the vessel must be constructed of manageable dimensions for manœuvring purposes, and is therefore restricted in length, the number of the crew is based upon what is required for the efficient working of the engines, guns, and torpedos.

In other words, the housing of the crew is apt to be regarded as of secondary importance in the designing of a ship-of-war, as compared with the provision of space for carrying the greatest possible quantity of mechanical fighting material. That this must, to a certain extent, ever be the case, is a fact that has to be accepted by sanitarians; for the primary object of a man-of-war, in fact the object of its existence, is to act as a fighting machine; and the country requires, and the rivalry of other great powers requires, that all other functions be to some extent subordinated to this.

The very limited accommodation available for our crews, with its attendant inconveniences, is not, however, of so much consequence as might at first sight appear to be the case, because future naval actions are likely to differ very materially from those of the past in respect to duration. The terribly destructive action of the three great engines of modern naval warfare, viz., the heavy gun, the ram, and the torpedo, will probably limit the duration of an engagement to a very brief period. Again, owing to the very extensive use of steam propulsion and the facilities for obtaining information of a vessel's movements afforded by the telegraph wire, vessels will not now-a-days require to keep at sea so long as in former times. Hence it is that the evils entailed by a long-continued subjection to insufficient air-space on board ship, will not (as formerly) come into force so as, by lowering the physical efficiency of our men, to influence materially the issue of a naval action at sea.

The question of airspace and ventilation as applied to men-of-war has always been a difficult problem, and the progress of modern naval architecture, necessitated by altered conditions of warfare, tends in many

ways to make its solution more difficult of attainment. Among these conditions may be mentioned (1) the very great amount of airspace occupied by machinery and stores connected with torpedo work, and (2) the introduction of watertight bulkheads. These latter partitions are a great source of difficulty in respect to obtaining a complete circulation of air throughout a ship.

It is of little use to draw comparisons between house ventilation and ship ventilation in regard to the steps to be taken for successfully coping with the latter, because the conditions are widely dissimilar. The contrast must be obvious when one calls to mind the ever varying position of a ship with regard to sunshine and wind, the deflection of air-currents caused by the trim of the sails and the consequent interference with uptakes and downtakes, and the number of apertures in the shape of hatchways, ports, and scuttles which have to subserve other purposes besides those of ventilation; all of these rendering somewhat abortive those systems of ventilation (applicable to houses) which depend upon the action of natural forces.

The introduction of the turret and barbette system of construction into our modern battleships, with the consequent reduction and almost complete abolition of apertures for natural ventilation by means of ports and hatchways, has rendered necessary a very general use of artificial ventilation by means of rotary fans, to supplement artificial ventilation by means of funnel and funnel casing.

Since rotary fans driven by steam were first supplied to our ships, opinions have differed as to whether these ventilating appliances should be fitted so as to drive in fresh air or to exhaust the vitiated air. Most of our new battleships are fitted with "supply" fans only, but in two vessels of recent construction there are fans both for supply and for exhaust; so that in these two vessels provision is made for a complete artificial circulation of air throughout the ship. In a ship which was quite recently launched, "supply" fans only are fitted; so that the impression appears to be gaining ground that where one system only is to be adopted, that by "supply" is preferable.

For my own part I am inclined to adopt the view (which will, I fear, be considered heretical by most sanitarians) that on board modern war vessels the "supply" system of ventilation is preferable to that by "exhaust." If the interior of a vessel were an enclosed space without sub-division into many separate chambers, and if there were but two apertures communicating with this space, then, no doubt, the application of an air exhaust to one aperture would, if maintained long enough, change the air of the entire space by the admission of fresh air through the other opening. But such a style of construction is practically not attainable. Exhaust fans, as at present fitted, are apt by a process of what I may call "short-circuiting" to draw in fresh air largely through the hatchway or ventilating aperture nearest to the first opening in the main trunk of the fan, and, as regards distant portions of the ship, to perform the function of merely shifting foul air from one compartment to another. There is, moreover, a possibility of

"exhaust" fans antagonizing rather than assisting the action of the "supply" fans.

The distribution of air from a "supply" trunk to various parts of a ship, is in another respect attended with considerable difficulty, viz., in regard to regulating the flow of air through lateral perforations or grating apertures. This is owing to the fact that in the air-trunk from a centrifugal "supply" fan, although the velocity be considerable, the pressure is very low. Hence it is that the current of air in passing by one of these openings tends to set up an aspiratory action on the vitiated air outside, rather than to deliver fresh air. The action I here refer to is similar to what takes place, when the wind blowing horizontally over a chimney exerts an aspiratory influence on the air inside the chimney, and thus draws up air from a cold firegrate. To meet this difficulty I would suggest that all the branches from a "supply" air-trunk should be made to enter the trunk for a short distance with the ends inclined towards the air-current; or else guides should be fitted so as to answer the same purpose by diverting the required stream of air.

Of all the methods of artificial "exhaust" ventilation applicable to ships, I am inclined to think that that by means of the funnel and funnel casing is the most satisfactory.

The steamjet exhaust (Edmonds') is at present used only in troopships, and is considered objectionable on account of the *noise*, the collection of *water* arising from condensation in the ventilator, and the waste of steam.

A method of extracting foul air by means of the *induced draught* set up in a ventilating shaft by the emission of compressed air at *low tension* discharged from a ring-jet is now in contemplation.

The warming of men-of-war (more especially ironclads) in cold weather is a very important matter, not hitherto sufficiently provided for. The usual method at present is by means of bogey fires, a method which is not only troublesome and dirty but is also dangerous, both in regard to the risk of the decks catching fire and the products of combustion causing asphyxia from insufficient outlets for smoke being provided. A better plan would be to have a system of steam pipes disposed throughout the berthing deck, and arranged so as to take steam from the main boiler, furnished, if necessary, with reducing valves so as to maintain a low and uniform pressure.

A greater difficulty is to provide a means of *cooling* the air between decks in tropical regions, more especially when the ship is at sea and under steam. It has been suggested that this might be effected by using compressed air, both as a source of motion for ventilating purposes and also as a means of abstracting heat when undergoing expansion while doing work.

In order to facilitate the application of artificial ventilation to the sleeping places on board ship, I would urge that in the construction of our battleships a single space (uncomplicated by bulkheads) should be set apart for the accommodation of the crew. (At present the crew, at all events as regards their sleeping billets, are scattered over various

parts of the ship). Such a scheme would render it possible to lessen the number of branches and apertures to ventilating shafts, and therefore to concentrate and regulate with more precision the application of ventilating apparatus to that portion of the ship where it is mainly needed. Moreover, if the crew were thus grouped together the task for providing for the maintenance of a suitable temperature would be less difficult.

In turret and barbette ships such a space might perhaps be provided by giving greater capacity for accommodation of crew in that portion of the ship inside the breastwork; while in other classes of vessels the best position for the accommodation of the crew is under a roomy forecastle. In this latter situation there is little difficulty in obtaining efficient natural ventilation. Such accommodation (viz., in forecastle) is to be found in troopships, and to some extent in war vessels of a certain class.

DISCUSSION.

Le Docteur Paul Nyades (Médecin principal de la Marine, Membre du Conseil Sup. de santé), dit:—Je demande à signaler un point qui me paraît important dans l'intéressante communication de M. R. W. Coppinger, sur l'hygiène à bord des bâtiments. Je veux parler du chauffage des cuirasses (*ironclads*): il y a là une difficulté qui a été très vivement ressentie en hiver par les bâtiments de notre escadre de la Méditerranée, et plus encore par les cuirasses de la Division du Nord. Sur ces navires la température s'est souvent maintenue pendant plusieurs jours à 3° centigrade, dans les compartiments habités, et, ajouté à l'humidité inévitable, ce froid est une cause de vraie souffrance, en même temps qu'une mauvaise condition hygiénique pour les officiers et pour les équipages.

En France, le chauffage par le vapeur a été installé avec un plein succès à bord de certaines bâtiments de guerre; on étudie actuellement les moyens de l'appliquer à tous les cuirasses. Mais je sais porte à croire que nous avons avancés dans cette voie par la marine des Etat-Unis; je verrais volontiers un représant de cette marin dans notre section, nous renseigner complètement à ce sujet.

Dr. Collingridge, (Medical Officer of Health, Port of London), said:—I wish to make a few remarks with regard to the question of warming forecastles and crews' quarters.

The present system of cast-iron unlined "bogies," is a most dangerous, extravagant, and objectionable one.

There is a great difficulty in maintaining fire in these bogies for any length of time, and, therefore, a constant temptation to overheat in order to keep up the temperature as long as possible. Though rapidly heated, they rapidly cool, and hence are insufficient. When heated, they allow of the free passage of carbonic oxide and other products of combustion, and hence are dangerous.

Added to this, they are very easily broken on account of both their size and shape, and therefore are in the long run very expensive. Having made a series of experiments, I have come to the conclusion that the only reasonably effective and economical stove for this purpose is a circular wrought-iron one, lined entirely and covered with fireclay. As to the question of ventilation I would point out the very great differences

between ships-of-war and merchant ships. In ships-of-war the constant tendency is to divide and sub-divide spaces by bulkheads, and thus to interfere with ventilation to such an extent as almost to make change of air by exhaust an impossibility, and in this case it often becomes absolutely necessary to resort to "supply." But in merchant vessels the case is otherwise. Here the exhaust system modified to meet each individual case is the only one available. The general tendency in the construction of mercantile vessels is to open up as far as possible, and hence to facilitate ventilation.

Professor J. Lane Notter (Netley), said:—The subject of the ventilation of ships is most important, and we are all indebted to Dr. Coppinger for his able paper on this question; we all know that sickness and mortality are largely increased by impure air, and to this in a peculiar degree those who "go down to the sea in ships" are subject. There are few analyses of the actual composition of the air of ships that I know of. Drs. Moss and Belgrave-Ninnis, made some determination of the CO_2 in warships, but they were undertaken some years ago and have not, that I am aware of, been repeated. It would be desirable to have these experiments repeated. No one system of ventilation is applicable to all ships.

Those carrying cargoes require to have the hold especially ventilated, and this might be done through hollow iron masts acting as ventilators. In the Royal Navy, no special ventilation of the hold probably is required.

It is doubtful whether placing all the crew in one part of a ship is desirable. If the difficulty of ventilating the whole ship is so great, this would be intensified if a part only was occupied by a large number of men, and if the system of ventilation at any time failed, the danger would be vastly increased. If the motive power could be transferred without loss of force to the extreme ends of the ship by means of tunnelling like the vacuum brakes on railways, I feel sure some plan might be defined which would exhaust the impure air; or the "plenum" system might be adopted if found better, the difficulty of using the steam-engines as a motive power lies in the fact that at a distance the force is so diminished as to be practically nil.

Dr. H. E. Armstrong said:—The subject of cubic space in respect of ventilation, like that of quarantine, was one in which conflict of authority interfered with sanitation. The Board of Trade allowed a minimum of 72 cubic feet per person in the British Mercantile Marine. This amount (3 ft. × 3 ft. × 8 ft.), was merely that of a large box painfully suggestive of a coffin, which indeed, if not exceeded, it was. True the Public Health Act gave power to deal with overcrowding, but what sanitary authority could hope to abate overcrowding on shipboard in face of such a regulation as that? Happily shipowners were commonly more humane than to act up to the margin of its limits. Nevertheless, the overcrowding in the crew spaces was great, and accounted for much of the prevalence of respiratory diseases among crews. With reference to the subject of "bogey" fires, the speaker fully endorsed the remarks of Dr. Collingridge; such stoves, when either cracked or left open, gave off carbon monoxide which was injurious to the health of those who breathed it. One of the well-known effects of the presence of this noxious gas in the cabin of *e.g.*, passenger boats, and in crew spaces was drowsiness. Carried to a greater excess, death resulted from its inspiration.

The serious effects of the defective ventilation of stoke-holes on the health of the firemen demanded the attention of all interested in the sanitation of steamships.

The *smoke nuisance* was another evil in connexion with steamships. This was in this country difficult to deal with, both from a practical and legal point of view. The power given by the Public Health Act to deal with smoke from steamships applied only to vessels "lying in" the district of a port sanitary authority and not to vessels *in motion*. But every one knows that it is during movement that the smoke is given off in largest quantity, and such a vessel could not be interfered with. The speaker was hopeful that the recently exhibited "smoke annihilator" of Elliott would be found effectual on shipboard.

In connexion with *offensive cargoes*, one cause of ill-health among crews was their imperfect protection in crew spaces from the exhalations of the cargo by reason of defective bulkheads, &c.

Dr. Harris exhibited and explained a ventilator to which he had previously referred. This apparatus is constructed for removal of air from cabins and confined spaces by means of an induced current without the admission of water. A long shaft is surmounted by a very large bell-mould narrowing rapidly at the base. Air entering and passing down the shaft is reflected upwards, and caused an induced current. If a sea washes in the weight will open the valve and allow the water to run out. By the insertion of a valve, the inlet may be converted into an outlet.

It is found by practical experiment that the ventilator is efficient to the extent of 20 per cent. of its theoretical work.

Mr. Coppinger in reply said:—I desire to state that I agree entirely with Dr. Collingridge's remarks in regard to the "bogey" fire being an objectionable means of ship warming. It is, however, better than nothing, and cases arise when it has to be resorted to.

In the Royal Navy the greatest care is taken to allow free exit to the products of combustion. Moreover, the pattern used in the Royal Navy is not so likely to set fire to the ship as that described by Dr. Collingridge as used in the mercantile marine.

In the Royal Navy due allowance is made for the loss of air current arising from friction in angles and sub-division of ventilating shafts.

In regard to Surgeon-Major Notter's remarks as to the grouping of the men in one compartment being open to the objection that insufficient air space would be provided, I entirely agree with him that such a scheme would be inadvisable if it involved any reduction in air-space allowance. My idea is altogether in favour of an increase in air-space accommodation, combined with better supervision of the ventilation in the living space.

Provision is made for the *temporary* ventilation of the lower parts of war vessels by introducing cool air from a supply fan by means of a canvas tube led to the bottom of the compartment, the foul air being allowed to escape from a manhole opening.

In all our modern war vessels, stokeholes are efficiently ventilated. The stokehole is made air-tight, the only exit being by way of the furnaces and fresh air is driven by means of supply fans; thus a double object is gained, the fires being urged while the men are supplied with fresh air.

Le Service Sanitaire de l'Armée Roumaine.

PAR

Le Docteur A. Fotino, Médecin Inspecteur Général de l'Armée,
Buearest.

Le système de reerutement de l'armée Roumaine eorrespond à deux eonditions hygiéniques différentes; aussi deux ordres d'idées president ils à la prophylaxie des epidémies et des maladies eontagieuses.

L'armée Roumaine se compose d'une part de troupes permanentes, qui sont rélativement peu nombreuses, et de troupes d'infanterie territoriales (Dorobantzi), dont les effectifs sont considérables.

Les conditions hygiéniques des troupes permanentes différent très peu de eelles des autres armées Européennes.

Les casernes de l'armée Roumaine appartiennent en majorité au type à pavillons n'ayant qu'un seul étage; elles sont construites par unité de bataillon.

On observe très rarement dans notre armée des affections epidémiques générales; quant aux maladies infecto-contagieuses, elles n'apparaissent qu'à des périodes très éloignées et sur des territoires militaires généralement très restreints.

Il en résulte que la prophylaxie de ce genre de maladies n'exige aueune mesure extraordinaire, en dehors de l'observation rigoureuse et quotidienne des régles hygiéniques que réclament les grandes agglomérations d'hommes.

Les seules affections qui soient très fréquentes dans l'armée Roumaine sont celles à frigore; elles sont dues aux variations extrêmes de notre climat.

La Roumaine a en effet pendant l'été le climat des pays tropicaux, et pendant l'hiver toute l'âpreté des froids du Nord; cependant eela n'arrive pas chaque année.

C'est pour cette raison que l'administration de la guerre, après de longues et laborieuses études, a adopté eette année même, pour l'equipement des troupes Roumaines, un modèle de gilet de flanelle, entièrement différent de ceux qui sont employés ailleurs.

Ce nouveau type d'équipement se rapproche à peu-près complètement du vêtement que portent sur le tronc nos populations rurales.

D'ailleurs, les troupes permanentes de ligne, ainsi qu'une grande partie des troupes territoriales, disposent dans chaque commandement pour la prophylaxie des épidemies et des maladies contagieuses, d'étuves fixes ou transportables de désinfection, du système Geuest et Herscher.

Quand des maladies de ce genre se déclarent, les hôpitaux de l'armée (qui sont tous du système à pavillons) ont des locaux spéciaux pour l'isolement et le traitement des maladies infecto-contagieuses.

L'Hôpital eentral de l'armée à Bucarest est un model de ce genre, et nous pouvons affirmer sans crainte d'être contredit, qu'il eonstitue un

établissement sanitaire militaire unique et supérieur à tous les similaires dont disposent les armées de l'Europe orientale.

Dès le printemps et presque très avant dans l'automne, les troupes Roumaines quittent pour la plupart leurs casernements, et vont s'établir dans des camps provisoirs.

Grâce à cette methode, si rapprochée de la vie rustique, qui est celle de l'immense majorité de nos effectifs militaires, les troupes sont preparées et adaptées au plus simple régime hygiénique de vie, qu'elles pourront facilement pratiquer en temps de guerre, car elles y auront été de la sorte familiarisées.

Pendant cette periode le traitement des malades militaires a lieu sous des tentes d'ambulance. L'armée Roumaine possede la tente d'ambulance de la Croix-Rouge Roumaine, modèle qui se rapproche du système Tollet à charpente en fer, mais qui en différe par les dimensions.

Nous avons dit plus haut que le système de recrutement de l'armée Roumaine correspond à deux conditions hygiéniques differentes.

Ce que nous venons de dire jusqu'à présent se rapporte plutôt aux conditions hygiéniques des troupes permanentes. Pour ces troupes la morbidité est de 5 °/₀ et la mortalité de 11·68 par mille.

Pour les troupes territoriales (Dorobantzi) dont l'effectif est de beaucoup plus considérable, et qui, pour la plupart ne jouissent pas d'un casernement perfectionné, la morbidité et la mortalité sont, au contraire, de beaucoup inférieures, malades 3 °/₀, morts 3·57 par mille.

Ce succès hygiénique est le résultat de notre système d'organisation militaire. Je ne connais aucun pays d'Europe qui ait pu réaliser en tenant compte de son étendue territoriale et du chiffre de sa population, des effectifs aussi nombreux que les notres, et cela sans sacrifices matériels considérables et sans que l'élément militaire ait à payer un fort tribut de morbidité et de mortalité.

Eloigner le moins possible le futur soldat de son genre de vie habituel, chercher à ne pas détruire les habitudes et les mœurs dans les quelles il est né et a été élevé, développer son goût pour la vie en pleine champ en donnant le plus possible l'instruction militaire en plein air, faire son éducation hygiénique militaire dans les mêmes conditions, tel est le grand secret hygiénique, grâce auquel nous n'avons guére la notion pratique des *desastres épidemique militaires.* Ce fait a d'ailleurs été démontré par les chiffres de nos statistiques devant le congrès international de Berlin (1890) par notre distingué collègue la Médecin de Corp d'Armée et Professeur Dr. Z. Petresco.

Il est vrai que nos armées n'ont passé la frontière qu'en 1877, après environ deux siècles et demi d'inaction militaire, et que par conséquent des faits concluants font absolument défaut à l'histoire de notre épidemiologie militaire ; aussi ne saurions nous avoir la prétention d'apporter de nouvelles lumières scientifiques sur les questions d'hygiène qui sont soumises aux débats du Congrès.

Nous relatons purement et simplement ce qui se passe dans l'armée Roumaine sous le rapport de l'hygiène, avec la conviction que nos

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honorables collègues les medecins militaires ici presents trouveront dans cette communication des données et des observations dignes de toute leur attention.

La méthode la plus simple et la meilleure de concilier l'hygiéne pratique avec les exigences des guerres modernes est donc l'habitation temporaire sous la tente, genre d'habitation qui correspond le mieux et qui s'en rapproche d'avantage au genre de vie que mène le peuple, tout au moins le peuple Roumain.

Du reste avec ce système, les troupes s'accoutument plus facilement aux pratiques hygiéniques pour la periode des camps; elles apprennent à mieux appreeier les avantages ou les défauts d'un campement bien ou mal installé, à utiliser ou corriger les conditions hygiéniques de l'emplacement qu'elles occupent, et enfin au point de vue de leur instruction militaire, elles apprennent à temps à connaitre les qualités ou les défauts des differentes configurations des terrains en vue des néeessités de la guerre.

La Question de l'alimentation des troupes en rapport avec le climat et la nature du serviee est certainement un des problèmes les plus difficiles à résoudre de l'hygiène militaire moderne.

Dans l'armée Roumaine, ce problème est résolu, sinon définitivement, du moins d'une manière qui eorrespond presqu'entièrement et à notre climatologie et à la nature du serviee.

La nourriture des troupes Romaines est fixée par un tarif, tant pour le temps de paix que pour celui de guerre; les quantités de produits alimentaires qui y figurent sont à peu-près les mêmes pour les deux cas.

Ce tarif est identique pour toutes les troupes, sans distinction d'arme; il est en même temps accomodé au genre habituel de nourriture des hommes avant leur arrivée au corps.

Dans les limites de ce tarif, la nourriture des troupes Roumaines est laissée exclusivement à l'appreciation des commandants et du eorps médical, en ce qui eoneerne la variété.

L'administration de la guerre a, à eet effet, des allocations budgétaires spéciales, et des notes ministérielles périodiques fixent le montant en argent de la nourriture des troupes envoyées et les difficultés du service qu'elles ont à remplir.

L'administration militaire Roumaine fournit directement le pain aux troupes par ses manutentions; pendant les concentrations et les mobilisations, l'armée dispose du même corps special qui emploie des fours mobiles.

Les autres produits alimentaires sont achetés directement par les commissions d'approvisionnement de chaque corps de troupe; de cette façon, les hommes sont soustraits à la tentation de mal employer les ressources qui leur sont attribuées.

Voici le tarif dont nous avons parlé plus haut :—

Tarif pour la Nourriture des Hommes.

Quantités.				Nature des aliments.	Observations.
En temps de paix.		En temps de guerre.			
Grammes.	Litres.	Grammes.	Litres.		
1,130	—	1,130	—	Pain - - -	Il n'est donné à la fois qu'un seul de ces deux aliments.
1,500	—	1,500	—	Farin de maïs - -	
700	—	800	—	Biscuit - - -	
400	—	500	—	Viande fraîche - -	Comme plus haut.
350	—	350	—	„ conservée -	
500	—	500	—	Poisson frais.	—
350	—	400	—	Fromage blanc, saucissons, viande sechée, exceptionnellement poisson salé, olives.	Avec le fromage blanc on donne des ognons, des poivreaux ou de l'ail.
250	—	250	—	Légumes, haricots, choux, pois, etc.	A préparer avec la viande.
300	—	300	—	Pommes de terre -	
50	—	50	—	Riz, orge, vermicelle, semoule.	—
60	—	100	—	Haricots ou pois sécs -	Sans viande les jours de maigre.
200	—	200	—	Haricots ou lentilles sèches - - -	
400	—	400	—	Haricots verts, petits pois, pommes de terre.	—
20	—	25	—	Sel pour la soupe -	Quand la viande n'est pas salée, ou quel'on n'a pas donné de fromage blanc.
20	—	20	—	Sel pour la bouillie de maïs.	Quand cet aliment remplace le pain.
25	—	25	—	Bignous pour la soupe de viande ou le bouillon, de poisson (les autres légumes selon que besoin en est).	Lorsque les hommes reçoivent des choux, on ne donnent que l'indispensable en autres légumes.
5	—	5	—	Poivrons ou poivre -	Pour la soupe ou le potage de poisson.
—	—	—	—	Poivreaux, radis, olives ou autres légumes verts.	Les jours de maigre l'on donnent l'un de ces articles.
—	0·030	—	0·030	Vinaigre - -	Les jours de maigre quand on donne des Haricots ou lentilles.
—	0·010	—	0·010	Huile fraiche - -	
—	0·060	—	0·080	Eau de vie à 16° -	Chaque jour.
—	0·400	—	0·400	Vin - - -	Seulement par ordre.

Comme on peut le voir d'après le tableau que nous avons reproduit plus haut, les rations alimentaires allouées aux troupes Roumaines sont si riches et si variées, en égard aux conditions climatologiques de notre pays, que la faculté laissée au commandement de distribuer aux hommes des boissons fermentées, purement alcoliques ne marquant pas plus de 16 degrés Baumé au maximum, prouve suffisament la sobriété du peuple Roumain, sobriété qu'il a acquise et developpée par les conditions dans

lesquelles il a soutenue la lutte pour l'existence, et sur la quelle est basé le tarif alimentaire de l'armée Roumaine.

Les Drs. MacNalty et Frasser, médecins supériéurs de l'armeé Anglaise, qui en 1877 furent envoyées par le ministère Anglais de la guerre et se sont avancés jusque dans les premières lignes d'opérations de l'armée Roumaine autour de Plevna, ont eu l'oecasion de se convaincre que la vie matérielle des troupes Roumaines a été et est basée sur le prineipe de la sobriété.

Sur les ehamps de bataille, ou tout depend de la rapidité et de la précision des mouvements, il est évident que si l'alimentation des troupes tend à imposer la ration physiologique, le eommandement et l'administration de la guerre seront gênés dans la poursuite du but suprême des opérations militaires.

Mais on comprend que ee n'est pas à nous autres médeeins militaires de sacrifier des verités scientifiques à des buts plus ou moins éphémères ou passagers. L'intérêt suprême cependant commande dans eette question de l'alimentation des troupes, qu'elle soit basée exclusivement sur une nutrition substantielle, et en même temps sur *la sobriété.*

Voilà ce que nous croyons et pratiquons ce que nous pensons être la seule base possible pour la solution du grand problème de l'alimentation des armées.

Nous croyons que le regime alimentaire des troupes Roumaines réunit sous ee rapport les meilleures conditions hygiéniques, tant au point de vue des habitudes et du climat, qu'au point de vue de la nature du service.

En ee qui coneerne les methodes les plus simples pour assurer l'assistance et le transport des blessés en temps de guerre, l'armée Roumaine possède un service special.

En temps de guerre, le corps médical permanent de l'armée est augmenté des cadres de réserve dans les quels figurent tous les médecins jusqu'à l'âge de 40 ans comme officiers sanitaires inférieurs, jusqu'à 50 ans comme officiers superieurs et jusqu'à 55 comme officiers generaux.

Cette élément sert à completer les vacanees éventuelles dans les cadres des troupes mobilisées, à eonstituer les ambulances divisionaires, celle des corps d'armée, ainsi que les ambulanees d'étape sur les champs d'opérations militaires. Une seetion de la Croix-Rouge est attaehée près des ambulances de corps d'armée.

Le service médieal dans l'interieur du pays est assuré par des médecins officiers inférieurs jusqu'à l'âge de 50 ans, officiers superieurs de 50–55 ans et officiers généraux jusqu'à l'âge de 60 ans.

Cet élément de l'armée porte le nom de milices.

Le corps médical des milices est appelé en temps de guerre, à assurer le service des blessés et des malades de l'armée, soit dans les hôpitaux permanents, soit dans les hôpitaux temporaires, ainsi que le service des étapes et des trains sanitaires à *l'intérieur du pays.*

La première unité des ambulanees de l'armée Roumaine est basée sur l'unité de bataillon pour des troupes d'infanterie, et sur l'unité de

batterie pour les troupes d'artillerie; quant à la cavalerie outre son personnel et son matériel basés sur l'unité de division, elle reçoit le concours du personnel sanitaire des troupes d'infanterie auprès des quelles elle est attachée.

L'ambulance d'un bataillon se compose d'un médecin inférieur, de deux cantines avec matériel et objets de pansement, d'une trousse avec des instruments de chirurgie, du modèle de l'armée Roumaine, qui est celui de Nussbaum, modifié très avantageusement par notre très estimé collègue le médecin de corps d'armée et Professeur Dr. Démosthénes, de huit sacs de soldats sanitaires avec les objets pour le premier pausement, un sac de sergent sanitaire, une petite pharmacie portative, avec des medicaments tout préparés et dosés sous forme de pastilles (medicaments comprimés), et huit brancards Percy.

Une batterie d'artillerie a un médecin inférieur, une cantine avec matériel de pansement, qui contient en même temps une petite bôite d'instruments de chirurgie, deux sacs des objets de premier pansement et deux brancards Lipowski.

La composition des ambulances mobiles de l'armée Roumaine a pour base l'unité de section. Une section d'ambulance est ainsi composée :—

Un Médecin en Chef.
Trois Médecins Auxiliaires.
Un Pharmacien.
Un Officier d'Administration.
Un Commandant de Troupes.
Cinquante Soldats Sanitaires.
Trois Voitures Dietrich.
Un Fourgon d'Ambulance.
Une Cuisine de Campagne.
Un Tonneau d'Eau.
Vingt-cinq Brancards Percy.
Vingt-cinq Paquets de Matèriel d'Hôpital.
Une Pharmacie Portative.
Cinque Valises de Sergent Sanitaire.
Quarante-cinq Valises de Soldat Sanitaire.
Quatre Grand Tentes d'Ambulance.

Les ambulances divisionaires comprennent quatre sections organisées de façon à pouvoir fonctionner chacune isolément, dans le cas où seulement une partie des troupes divisionaires serait engagée.

Le réglement du Service Sanitaire de l'Armée Roumaine prévoit comme suit l'assistance et le transport des blessés pendant la luite.

A une distance de tout au plus 2,000 mètres et immédiatement derrière la ligne d'attaque, tous les médecins des troupes engagées, sont postés sur un emplacement aussi abrité que possible et connu des officiers et des troupes.

Sur ce premier poste de sécours les médecins ont à leur disposition le personnel et le matériel prévu par unité de battaillon, les quels sont constamment renouvelés par l'ambulance divisionaire ou la section

d'ambulance la plus proche, qui a des paniers de matériel de réserve avec une nomenclature identique à celle du premier poste de secours.

Les attributions de ce premier poste de secours, se bornent à examiner sommairement les blessés, à arrêter les hémorragies, à appliquer les appareils improvisés aux fractures, à relever les hommes tombés et à les évacuer rapidement sur l'ambulance la plus rapprochée.

Cette question considérée à ce point de vue et étudiée de plus près, nous entraînerait dans le domaine de la chirurgie militaire et ce n'est pas ce que nous nous proposons de faire en ce moment.

Parmi les differents systèmes pour assurer l'assistance et le transport des blessés, nous considerons comme le plus simple et le plus recommandable celui qui quoique se basant sur ces deux grandes vérités scientifiques l'assepsie et l'antissepsie, cherchera cependant le moins possible à imposer ou à consacrer cette scolasticité moderne sur les champs de bataille.

Dans ces moments suprêmes où l'histoire d'un pays et l'avenir d'une nation sont en jeu, l'hygiéne ainsi que la chirurgie militaires ont elles aussi un but suprême qu'elles ne doivent pas perdre de vue : celui de ne pas gêner ou compliquer le résultat des opérations par des exigences déplacées, et que l'urgence du moment ne permet pas de satisfaire.

Cela est certainement pénible pour l'homme de l'art, mais notre expérience de la guerre 1877–1878 nous donne raison.

A cette époque les ambulances de l'armée Roumaine avaient à leur disposition des cartouches de premier pansement, très différentes de ce que l'on pourrait nommer aujourd'hui des cartouches de premier pansement asseptique.

Ces cartouches consistaient en un peu de charpie et une petite compresse contenue dans une band roulée le tout prépare et conservé en paniers, longtemps avant l'ouverture des hostilités.

C'est avec ces cartouches si simples et si primitives que tous nos blessés ont été pansés au premier poste de secours, et notre statistique n'a enregistré alors que 1 % de cas de septicémie.

Sur la base de cette expérience, les médecins en chef des corps d'armée constitués en commission en 1887 sous la présidence du soussigné, se sont prononcés à l'unanimité pour un type de cartouche de pansement à peu près identique à celui que nous avons décrit plus haut.

Cette question est maintenant de nouveau à l'étude dans l'armée Roumaine; mais il est certain que le prix élevé du matériel, sa conservation couteuse et la difficulté d'obtenir une manipulation facile, rapide et accessible même aux blessés, nous empêcheront de satisfaire aux exigences de l'assepsie et de l'antisepsie classiques. Nous croyons donc, que le moyen le plus simple et le meilleur de venir en aide aux blessés, sur le théâtre même des opérations, c'est celui qui est le plus simple, le moins cher et que l'on peut employer le plus rapidement.

Les cartouches de pansement qui ont été admises en 1887 par les médecins en chef des grandes unités de commandement de l'armée Roumaine répondent entièrement aux nécessités pratiques.

Cette cartouche composée de 10 grammes de ouate hydrophile, de quatre morceaux d'organtine hygroscopique, d'un triangle et de gutta-

percha laminée, réalise dans une certaine mesure les exigences du pansement asseptique et par occlusion.

En effet cette cartouche ainsi constituée et préparée longtemps avant l'époque des opérations militaires est peu chère, se conserve parfaitement, peut être employée facilement, et il n'est pas nécessaire d'en charger le soldat, ce qui prédispose toujours un peu son moral à l'inquiétude ; et en definite, elle est parfaitement sterilisable au moment où on l'emploie.

Nous disposons de fours et de cuisines de campagne, et la température que l'on peut y développer est égale en efficacité stérilisante, à celle des plus admirables étuves spéciales.

Par cette méthode simple, les secours donnés aux blessés dans les premiers moments seront entourés de garanties parfaites, en ce qui concerne l'assepsie du matériel de pansement.

Pour le transport des blessés, l'armée Roumaine dispose d'un parc réglementaire de voitures d'ambulance Dietrich et de fourgons de matériel sanitaire Lohner.

Malgré cela, pendant notre guerre de 1877–78, comme la Bulgarie d'alors était dépourvue de bonnes voies de communication, les blessés, ceux de l'armée Roumaine surtout ont été transporté jusqu'à la fontière de Roumanie, avec des chariots requisitionnés, et attelés de boeufs ou de buffles.

Peut-être regardera-t-on comme barbare ce genre de transport pour des blessés, mais de même que les problèmes militaires tendent à trouver leur solution par l'utilisation des configurations de terrain, qui peuvent naturellement empêcher ou faciliter les marches ou les mouvements des troupes en lutte, les sécours à donner aux blessés et le transport de ceux-ci, est fatalement subordonné aux nécessités tactiques.

Par conséquent, quand les troupes opèrent dans des contrées montagneuses ou sur des terrains accidentés et incultes, déponrvus de voies carrossables, nous croyons que le principe dont nous devons nous inspirer pour effectuer dans les meilleures conditions possibles le transport des blessés est de se servir exclusivement de la méthode et des moyens de transport des localités où les troupes opèrent.

Nous pouvons difficilement nous imaginer après cela que même l'invention la plus géniale en fait de moyens de transport des blessés par voie de terre, puisse s'imposer en pratique sur les théâtres d'opérations militaires.

A ce point de vue donc, nous ne croyons pas qu'il soit rationnel de tendre à uniformiser le mode de transport des blessés en temps de guerre, en consacrant une méthode internationale.

Note Additionnelle.

Les deux milles blessés de l'armée Turque, dont les ambulances de l'armée Roumaine ont pris la charge au lendemain de la rédition de Plevna, ont été évacués de la même manière à l'intérieur de la Roumanie, et par les mêmes moyens que les blessés de l'armée Roumaine.

Les médecins militaires Turcs, qui ont survécu à ces événements, avoueront certainement que la méthode employée par les Roumains pour transporter les blessés Turcs, a été salutaire pour ceux-ci, car les pertes, bien quel'hiver ait été exceptionnellement rigoureux, n'ont pas dépassé 10 % pour les blessés qui ont été traités en Roumanie.

DISCUSSION.

Bérenger Féraud (Paris), dit :—Mon ami Colin, Inspecteur Général du Service de Santé de l'armée française, regrettera, j'en suis certain, que les exigences de ses fonctions l'aient empêché d'être présent ici aujourd'hui. Il aurait assurément été interessé comme moi par la remarquable communication de notre collègue. L'éminent Dr. Fotino a montré par ce qu'il vient de nous dire que, dans les armées, l'adage *non numeranda sed ponderanda* a une importance de premier ordre. Je ne suivrai pas l'honorable Dr. Fotino dans tous les détails de sa communication. Je craindrais, en ma qualité de marin, de n'avoir pas toute l'autorité nécessaire. Mais je veux lui dire tout le plaisir que j'ai éprouvé en lui entendant parler de l'habitation sous tente comme moyen de diminuer dans certaines circonstances la morbidité des corps de troupe. Etant chef de service à Lorient, à Cherbourg, à Toulon, j'avais déjà constaté l'excellence de cette condition, et, tout récemment encore je viens de la préconiser.

Cette habitation sous tente n'est pas toute l'hygiène, il faut avec elle mille conditions au premier rang des quelles se place la bonne eau d'alimentation.

Mais, néanmoins, ce mode primitif d'habitation, qui rapproche l'homme de l'état de nature, est préférable, en cas d'épidémie, aux grandes maisons où les hommes sont agglomérés.

Le Docteur Duchaussoy (Professeur Agrégé à la Faculté de Médecine de Paris), dit :—Je suis heureux de pouvoir m'associer aux paroles que notre honoré confrère M. Béranger Ferand vient de faire entendre, et d'ajouter que je tiens des Medecins turcs le récit plein de reconnaissence des soins heureux que leurs blessés ont reçus en Roumanie.

Mais je demanderai à l'honorable M. Fontino s'il peut compter sur les appareils de cuisine pour stériliser la cartouche de pansement?

La cuisine est elle derrière les combatants? Non, sans doute; il y a donc encore sur ce point un désideratum. J'approve entièrement la précaution de ne pas laisser la cartouche de pansement au soldat; elle est toujours détériorée.

Wednesday, 12th August 1891.

The Chair was occupied successively by :—

The President, Lord Wantage ; and

Dr. B. H. Thomsen, Colonel Directing Medical Officer, Dutch Navy.

Dietary Scales in connexion with the Health of Seamen.

BY

W. Spooner, L.R.C.P., M.R.C.S., &c.

The question of diet is intimately connected with the health of seamen, and I propose in this paper to point out wherein the quantity and description of food usually named in the dietary scales is neither fitted to maintain the general health of sailors, nor adapted to their special calling. I shall more particularly trace the connexion between the food supplied and that disease which used to be, and to some extent still is, the special scourge of the mercantile marine, viz., sea scurvy. There are some diseases which seem to defy the appliances of preventive science, but scurvy is not one of them ; it is caused essentially by improper food, and I look upon it as a disgrace, that in this present scientific age, this enlightened 19th century, "with all its appliances and means to boot," such on eminently preventable disease should exist at all.

In my capacity as medical inspector of the Board of Trade I have during the last 15 years held official inquiries into the cause and origin of outbreaks of scurvy, and I have never failed in tracing them directly to the nature of the food supplied. In every report I have made to the Board of Trade I have persistently drawn their attention to the necessity of a radical change in the dietary scale, and in 1883 they requested me to draw out a scale which I considered would be satisfactory. I will allude to this scale presently.

There is a common impression that the food scales signed by the crew at the commencement of their voyage are fixed by the Board of Trade. This, however, is altogether a mistake ; it is entirely a matter of contract between the master and the crew, and the Board of Trade merely see that the scale is inserted in the articles of agreement. Thus these scales possess no higher sanction than that of antiquity. Like that good old eminently respectable disease gout, they have been handed down from generation to generation, and date from some remote period in ancient history when nothing better could be obtained. The

following is a type of this good old-fashioned kind of food which many of our sailors have to put up with even now.

Scale of Provisions to be allowed and served out to the crew during the voyage.

——	Bread.	Beef.	Pork.	Flour.	Peas.	Tea.	Coffee.	Sugar.	Water.
	Lbs.	Lbs.	Lbs.	Lbs.	Pts.	Ozs.	Ozs.	Ozs.	Qts.
Sunday - -	1	1½	—	½	—	⅛	½	2	3
Monday -	1	—	1¼	—	⅓	⅛	½	2	3
Tuesday - -	1	1½	—	½	—	⅛	½	2	3
Wednesday -	1	—	1¼	—	⅓	⅛	½	2	3
Thursday -	1	1½	—	½	—	⅛	½	2	3
Friday - -	1	—	1¼	—	⅓	⅛	½	2	3
Saturday -	1	1½	—	—	—	⅛	½	2	3

Substitutes at the Master's option.

The above scale is by no means exceptional, but is the one signed for by the crew in the majority of English ships; and, although it might, perhaps, rejoice the soul of Mr. Banting, it cannot be considered of a luxurious nature. It is quite true that on many ships some extras are allowed; thus, very often a fresh mess, composed chiefly of soup-bouilli, is given on Sundays in addition; occasionally preserved meat is substituted once a week for salt; sometimes a certain quantity of butter is served out instead of a portion of meat, whilst some extravagant shipowners have even gone the length of giving marmalade and pickles. Such unwonted generosity is, however, by no means universal. In the articles of agreement at the different shipping offices skeleton scales are now kept ready printed at the instance of the Board of Trade, and in these scales are a number of blank columns to be filled up if the shipowner desires. These columns are headed respectively, soup-bouilli, preserved meat, preserved vegetables, rice, oatmeal, butter, molasses, &c. Until the last few years, however, and even now very frequently, as far as I have been able to ascertain, these columns remain blank, and the above articles are conspicuous only by their absence.

In considering the above scale of diet, it at once becomes apparent to the scientific inquirer, that it has been constructed with a total disregard to the physiological wants of the system; that in addition to its monotonous character, its excess of salt meat and lack of vegetables, the proportion of the different ingredients is altogether wrong. I will consider these points seriatim.

1st. *The monotony of the diet.*—The human organism is so constituted as to imperatively demand variety. If either fresh beef or fresh mutton, or roast chicken were given every day, the stomach after a time would instinctively revolt and refuse to do its duty; monotony would render it incapable of digestion. Salt beef one day and salt pork the next, given for months in dreary succession, is not very tempting, and not very conducive to healthy nutrition. Strong healthy men will stand this kind of diet for a considerable period, but it is merely a question of time; the weak and feeble and those whose constitutions have been

undermined by debauchery ashore, will first go to the wall, and if the voyage be sufficiently prolonged, the strong and healthy will follow in their wake, and an outbreak of scurvy be the result.

2nd. *The excess of salt meat.*—Even if the meat be good in quality, it cannot fail to be injurious if given day after day. The very process of salting has the effect of depriving the meat of some of the soluble constituents, such as the organic acids, the alkaloids, and extractive matters, and renders the residue hard and indigestible; it is also probable that some of the salts of potash are replaced by those of soda. Moreover, highly salted meat must be thoroughly steeped in water to render it eatable, and by this means still more of the soluble constituents are washed out. It must also be remembered that salt, like charity, may cover a multitude of sins, and previously unwholesome and unsound meat may have its noxious properties concealed by being salted. I have a vivid recollection of a piece of salt beef of this description; it looked sound and even smelt tolerably sweet, but after the salt had been partially extracted by soaking and boiling, and it was placed upon the table, it at once became apparent both to the palate and the nostrils that "there was something rotten in the state of Denmark." I should suggest, therefore, that for at least three days in the week preserved meats, either beef or mutton, should be substituted for salt. Preserved meats, weight for weight, are more nutritious than salt, and cost very little more. They can be served in a variety of ways, either eaten cold or made into a hot-pot or sea-pie with a due admixture of fresh or preserved vegetables; and, in fact, many savoury dishes can be prepared from them, which is impossible with salt junk.

3rd. *Deficiency of vegetable food.*—It has been abundantly proved that the true cause of scurvy is a deficiency of the salts found in fresh vegetables, and there are many cases on record when an outbreak of this disease has been quickly stopped by simply giving a few raw potatos. It is, therefore, of the utmost importance that a sufficient quantity of fresh potatos or other vegetables should be put on board the ship to last for at least the first two or three months of a voyage, and whenever there is a possibility of putting into a port these should be replenished. It is to the system of giving plenty of potatos that the American ships owe their immunity from scurvy—surely what they can do can be done on British ships. Again, there are few foreign ports where fresh vegetables of some kind cannot be procured, but it is unfortunately too often the case that the captain is more anxious to please the owners by an appearance of economy than to preserve the health of the crew, and in the long run, it is often found that the old proverb of "penny wise and pound foolish" is fully illustrated. In all cases when the fresh vegetables are exhausted, preserved vegetables, either potatos, carrots, onions, or pickles should be given instead. The law now provides that one ounce of lime-juice shall be given to each man per day, but with a proper supply of vegetable food, lime-juice would be unnecessary; it is at the best but an imperfect substitute, and is not always taken.

4th. *Improper proportion of the different ingredients.*—It is well known that a proper scale of diet should contain a due admixture of the

nitrogenous or flesh-forming constituents, comprising vegetable albumen, fibrine, and caseine, and animal flesh and blood; and of the non-nitrogenous carbonaceous or heat-producing substances, comprising fats, sugar, starch, gum, &c. Numerous experiments have established the fact, that the nitrogenous should bear to the non-nitrogenous ingredients about the proportion of one to five. According to Dr. Lyon Playfair, a man doing active but not excessive hard work (like sailors) requires daily about 5·5 oz. of flesh-forming food, and 26·3 oz. of carbonaceous, the ratio being as 1 to 4·8. In the scale allowed in the navy, the flesh-formers=5 oz., and the heat givers 20·4, the ratio being as 1 to 4; whilst in the army the flesh-formers=4·2 ozs., and the heat givers 22·06, the ratio being as 1 to 5·2. Now, I have calculated the amount of these ingredients in the ordinary scale of the merchant sailor according to the table of Dr. Playfair, the fat, sugar, and starch being reduced to one equivalent, viz., that of starch; and I find it consists of 6·912 ozs. of flesh-formers, and 22·416 ozs. of heat givers, the former standing to the latter in the proportion of 1 to 3·3.

Thus it appears that the diet of sailors contains a greater amount of nitrogenous food than is required for a man in active labour, greater even than a navvy employed in the very severe work of a railway cutting consumes, and this is owing to the excessive quantity of animal food. In the navy the men are allowed only 1 lb. of fresh or ¾ lb. of salt meat, and in troop ships the daily allowance is ¾ lb. of salt meat for four days in the week, and ¾ lb. of preserved meat the remaining three days. There is no doubt that too much animal food, particularly when there is no severe muscular labour, is injurious to health; it will produce a state of plethora of the system, and cause derangement of the liver, and a predisposition to blood diseases. I am of opinion that 1 lb. of salt meat or ¾ lb. of preserved meat, which is without bone, is ample for all requirements, and the saving thus effected may advantageously be expended on other articles.

Bearing in mind, therefore, the principles I have now enumerated, I drew out a scale for the Board of Trade, which I considered, though by no means perfect, would answer the purpose sufficiently well. I endeavoured to combine physiological correctness with a due amount of economy. This scale is given in detail on the opposite page.

The chief points in which it differs from the old scale are the following:—Preserved meat is substituted for salt meat three days in the week. The quantity of meat altogether is reduced, and potatos and carrots, either fresh or preserved, butter, oatmeal, rice marmalade, raisins, molasses, suet, and pickles are added. Preserved meats and vegetables may now be obtained in such perfection that there is no possible reason why they should not be carried; but with regard to the latter, they should only be given when it is impossible to keep fresh ones. Raisins and suet, with an additional quantity of flour, are added, in order that plum pudding may be sometimes given, and oatmeal and molasses form an agreeable change for breakfast. Marmalade has been tried in some ships, and found to answer very well—it renders the hard

PROPOSED VICTUALLING SCALE to be served out to the Crew per Day, in addition to the issue of Lime-juice and Sugar required by Law.

—	Biscuit.	Flour.	Beef.	Pork.	Preserved Meat.	Peas.	Preserved Potatos.	Preserved Carrots.	Butter.	Oatmeal.	Rice.	Marmalade.	Sugar.	Raisins.	Molasses.	Suet.	Pickles.	Tea.	Coffee.
	Oz.	Oz.	Lb.	Oz.	Oz.	Pt.	Oz.	Oz.	Oz.	Oz.	Oz.		Oz.					Oz.	Oz.
Sunday -	12	8	–	–	12	$\frac{1}{3}$	2	8	2	–	–		2						1
Monday -	12	–	1	–	–	–	2	–	–	4	–		2						1
Tuesday -	12	8	–	–	12	–	–	8	–	–	–		2						1
Wednesday -	12	8	–	12	–	$\frac{1}{3}$	2	–	2	–	4		2						1
Thursday -	12	–	–	–	12	–	–	8	–	4	–		2						1
Friday -	12	8	1	–	–	–	2	–	2	–	–		2						1
Saturday -	12	8	–	12	–	$\frac{1}{3}$	2	–	–	–	4		2						1
	lb. oz.	lb. oz.	lb.	lb. oz.	lb. oz.	pt.	oz.	lb. oz.	oz.	oz.	oz.	lb.	oz.	oz.	pt.	oz.	oz.	oz.	oz.
1 man per week -	5 4	2 8	2	1 8	2 4	1	8	1 8	6	8	8	1	14	8	$\frac{1}{2}$	4	4	1	7

1 lb. per week.

$\frac{1}{2}$ lb. per week.

$\frac{1}{2}$ pint per week.

4 ozs. per week.

4 ozs. per week.

SUBSTITUTES.

Fresh meat to be given instead of salt, and preserved as long as possible after leaving port.

Fresh potatos, carrots, &c., $3\frac{1}{2}$ lbs. per week, instead of preserved vegetables, as long as they last.

Oatmeal may be substituted for rice in cold weather, and *vice versâ* in hot weather.

Preserved onions may be substituted for preserved carrots.

biscuit more palatable. Pickles go well with salt meat, and are anti-scorbutic in their nature. I have calculated the respective quantities of nitrogenous and carbonaceous ingredients in the above scale, and find that it contains 6·144 ozs. of the former, and 29·376 ozs. of the latter, the ratio being as 1 to 5. I have also estimated the price, and find that it does not exceed 1*s.* per day, which certainly cannot be considered excessive.

Since the circulation of the paper containing this scale, which, however, the Board of Trade merely recommended, there has been in many instances, especially in Liverpool, a marked improvement in sailors' food, and many firms have adopted a scale more or less allied to it, and some even more liberal. I may mention especially the British Ship Owning Company. That the result has been extremely beneficial the following statistics will show :—

"Outbreaks of Scurvy reported to the Board of Trade during the last 15 years."

Year.	Outbreaks.	Year.	Outbreaks.
1875	58	1883	51
1876	69	1884	27
1877	80	1885	36
1878	84	1886	31
1879	93	1887	40
1880	92	1888	19
1881	99	1889	20
1882	60		

It may be observed that the scale was circulated in 1883, and that since that date the number of outbreaks have been reduced by more than half. These facts speak for themselves. I have no hesitation in saying that, if some such scale (the above errs, perhaps, on the side of economy) were made compulsory, the health of the British mariner would be very much improved, and scurvy would in a short time be totally eradicated and remembered only as a curiosity of the past, a relic of a barbarous and unscientific system of feeding. That this end may shortly be obtained is, in the interests of the seamen and of the shipowners themselves, "a consummation devoutly to be wished."

Statistics of Medical Cases admitted into the Seamen's Hospital, Greenwich, during the Decade of 1880-89, and of Cases of Scurvy admitted into the Seamen's Hospital and into the "Dreadnought," from 1852 to 1889.

BY

JOHN CURNOW, M.D. Lond., F.R.C.P., and
W. JOHNSON SMITH, F.R.C.S.

In Table I. we show (1) the total number of medical cases admitted, 7,718; (2) the number and per-centage of common diseases, such as rheumatism, cardiac valvular diseases, pleurisy, pneumonia, phthisis, and chronic albuminuria; and (3) of the rarer diseases from which sailors in the mercantile marine suffer in greater proportion than residents in this country, such as enteric fever, ague, aneurisms, dysentery, and abscess of the liver. The authors specially call attention to the large number of cases of phthisis (nearly one-seventh of the total), and believe that with better food and improved ventilation of the sleeping rooms, this could be materially decreased; and to the proportion

TABLE No. I.

Diseases.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	Total.	Per-centage of Medical cases.	Per-centage of Deaths
Total No. of Medical cases	795	754	870	871	606	574	793	839	839	777	7,718	—	—
Enteric fever	47	16	16	22	9	12	24	37	11	23	217	2·8	—
Do. deaths	7	5	3	5	0	2	1	3	2	2	30	—	13·8
Ague	58	50	82	55	26	78	66	70	38	42	565	7·3	—
Acute rheumatism	16	8	19	46	25	23	48	38	46	20	287	3·7	—
Chronic rheumatism	130	107	147	104	113	52	54	105	53	73	933	12·15	—
Cardiac valvular	28	20	27	34	25	28	36	64	34	40	336	4·3	—
Aneurisms	15	13	15	14	6	8	8	16	5	10	110	1·7	—
Pleurisy	19	13	19	18	12	15	23	25	21	4	169	2·2	—
Pneumonia	30	22	22	21	11	18	13	30	30	16	213	2·7	—
Do. deaths	13	7	7	13	6	5	4	8	11	5	79	—	37·09
Phthisis	85	82	94	126	125	95	124	115	102	106	1,054	13·6	—
Dysentery	46	40	49	63	34	25	24	35	27	21	364	4·7	—
Do. deaths	1	4	2	2	3	0	0	1	3	1	17	—	4·6
Abscess of liver	3	0	0	2	1	0	1	6	4	2	19	—	—
Do. deaths	1	0	0	1	1	0	1	4	2	2	12	—	63·15
Chronic Albuminuria	45	32	36	26	21	25	24	13	23	11	256	3·3	—

of cases of aneurism to cardiac valvular diseases, which is as one to three: an enormous excess in proportion to that found among the ordinary population, and which they attribute to syphilis as a factor in the causation, as well as to the mere strain of work.

Chronic rheumatism, as might have been anticipated, from the constant exposure to wet and cold, and from a poor diet, figures very largely. Pneumonia is very variable in its incidence, and is always very severe. A very large number of cases die within 48 hours after admission, and hence the per-centage of deaths is much higher than in ordinary hospitals (37 per cent.). Chronic albuminuria is less common than would be supposed from the sailor's habits, but here the long periods of enforced sobriety must be taken into consideration.

Enteric fever is still very common, and, like dysentery, is due to the water-supply being infected. In every case, on inquiry being made, it has been found that the water had been taken into the ship, or that the patient had drunk water, from a source of doubtful purity. The proportion of deaths from both enteric fever and dysentery is very small, especially in later years. The cases of enteric fever are all adults, and often exceptionally severe.

The number of cases of abscess of the liver is only 19, but of these 12 were fatal. In every case there was either co-existent dysentery or a previous history of that disease. In the present year, 1891, one case of chyluria, with filariæ in the blood, died in the hospital.

Tables II., III., and IV., at once speak for themselves. The great diminution in the number of cases of scurvy is due to (1) The Merchant Shipping Act of 1867; (2) the increase of steam shipping; and (3) the decline in the number of sailing vessels in recent years. More rapid voyages mean more frequent supplies of fresh food, and thus must eventually lead to the practical extinction of this disease.

The vessels engaged in the East Indian trade, many of them old sailing vessels, and often making very prolonged passages, still show an invariable preponderance in their number of cases [204 out of 284]; but in the past few years there is a great improvement even in the vessels trading to these ports. In the consideration of the prevention of scurvy, the following points are of the first importance: (1) It is unknown in the Royal Navy; (2) it never occurs in the higher grades of our mercantile marine; (3) the men engaged on board steamships do not suffer from it; (4) neither captain nor first officer has ever been admitted into the Seaman's Hospital with scurvy; (5) it is limited to the ordinary seamen in sailing vessels, and generally occurs after an unusually long voyage, it is "a disease of the forecastle"; (6) patients have been admitted who have regularly taken apparently good "lime juice" for a long period, but whose dietary in other respects was bad, so that lime juice must only be considered as the most valuable adjuvant in the prevention of scurvy, and not as an absolute and complete substitute, in itself, for a proper anti-scorbutic diet; (7) meats and vegetables (especially potatos) can be preserved so as to retain their special characteristics for a much longer period than the longest voyage; (8) in Mr. Leigh Smith's

second voyage to Franz-Josef Land in the "Eira," in 1881, 25 explorers, officers and men, remained free from scurvy, notwithstanding the absence of lime juice from their diet, during a sojourn of 15 months in the Arctic regions. They fed, when possible, on the flesh of recently killed animals in large quantities, and the blood was freely added in the cooking, while preserved vegetables were taken with every meal.

TABLE No. II.

Ports to which Ships with Scurvy belonged 1875–1889.

British.

Ports.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	Total.
London	7	1	5	1	7	10	9	12	1	1	1	4	2	—	—	61
Liverpool	4	16	4	3	4	11	8	2	5	—	1	1	4	6	1	70
North of England Ports	1	2	—	3	3	2	—	2	1	—	1	—	—	—	—	15
Glasgow and Greenock	2	4	5	6	5	12	7	1	5	2	1	—	1	1	1	53
Other Scotch Ports	—	2	1	—	—	1	—	1	—	—	1	—	1	—	—	7
Irish	1	—	5	—	—	—	—	2	—	—	—	—	4	—	—	12
Welsh	—	—	—	—	—	3	4	—	—	1	—	—	—	—	—	8
Other English Ports	—	2	—	—	2	1	—	—	—	—	—	—	—	—	—	5

Foreign.

Ports.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	Total.
Danish	—	—	—	1	3	1	—	—	—	—	—	—	—	—	—	5
German	—	—	1	5	1	1	1	3	—	—	2	—	—	—	—	14
Norwegian	—	—	—	1	—	2	—	1	—	1	—	—	—	—	—	5
Swedish	—	2	—	6	2	—	—	—	1	—	—	—	—	1	—	12
Belgian	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Italian	—	—	—	—	1	1	—	—	1	—	—	—	—	1	—	4
Greek	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
British North America	—	—	2	4	—	1	6	2	1	—	1	—	—	—	—	17
U. S. America	—	—	1	—	—	—	—	2	—	—	—	—	—	1	—	4

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TABLE No. III.

Cases of Scurvy admitted into "Dreadnought" and Seamen's Hospital from 1852 to 1889.

Date of "Merchant Shipping Amendment Act," 1867.

1852	51	1868	64
1853	63	1869	31
1854	124	1870	30
1855	159	1871	24
1856	91	1872	30
1857	77	1873	7
1858	77	1874	18
1859	90	1875	15
1860	77	1876	30
1861	99	1877	24
1862	64	1878	30
1863	86	1879	21
1864	74	1880	46
1865	101	1881	36
1866	96	1882	28
1867	90		
Average per Year	88·6	Average per Year, excluding 1868	26·4

1883	15
1884	6
1885	8
1886	5
1887	12
1888	10
1889	2

1864, 1865, 1866, 1867—13 Fatal Cases. Since 1868—5 Fatal Cases.
1869–75—Yearly average 22·1. 1876–82—Yearly average 30·7. 1883–89—Yearly average 8·3.

TABLE IV.

Last passages of Patients admitted with Scurvy from 1875–1889 inclusive:—

Ports.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.
Calcutta	6	15	9	6	6	19	10	11	4	2	2	1	8	1	2
Other British East Indian	4	6	2	16	15	11	15	8	7	1	4	4	3	8	—
China	—	—	1	—	—	6	—	3	—	—	—	—	—	—	—
Japan	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
East Indian Archipelago	2	—	2	—	—	—	—	1	1	—	—	—	—	—	—
Mauritius	—	1	5	—	—	—	1	—	—	—	—	—	—	1	—
North America	—	1	1	—	1	—	—	2	1	—	—	—	—	—	—
West Indies	1	1	—	—	—	1	—	1	—	1	1	—	1	—	—
Central America	—	—	1	—	1	1	—	—	2	—	—	—	—	—	—
South America (Atlantic)	—	2	—	5	—	—	5	—	—	—	—	—	—	—	—
Pacific Ports	—	—	2	1	—	1	2	—	—	—	—	—	—	—	—
New Zealand and Australia	2	1	—	—	2	2	—	—	—	1	1	—	—	—	—
West Coast of Africa	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—
Cape	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Black Sea	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—
Mediterranean	—	2	—	—	—	1	1	—	—	—	—	—	—	—	—
Baltic	—	—	—	1	—	—	—	2	—	1	—	—	—	—	—

DISCUSSION.

Dr. Rae, M.D., F.R.S., said:—Employed as surgeon in the Hudson Bay Company's ship, "Prince of Wales," in 1833–34, when 20 years old, our ship was stopped by ice and obliged to winter at Charlton Island, in Hudson's Bay. The ground on the island was covered with snow to the depth of about a foot when we landed, so no knowledge could be obtained of what berries grew there. Our provisions were salt beef, salt pork, and salted geese, a very common food among the employées of the Hudson Bay Company, in whose service I was surgeon for 20 years after the date mentioned. We had a little lime-juice and a few potatos. The first was judiciously used, and the latter were sliced up and eaten with vinegar as soon as scurvy shewed itself, but with little good effect. There were 17 cases of scurvy altogether in a party of 30 men, 9 or 10 of whom were passengers going home to England after some years' residence in the Hudson Bay Company's service. Of these men, if attacked at all with scurvy, the cases were slight. No fresh game of any amount could be obtained, and things went from bad to worse. The captain (Hamwell) and first mate were the first and also the only victims. The captain's case was scurvy, complicated with other disease, but the mate's disease was scurvy *per se*, and was frightful. He actually became black, or dark-blue, and putrid. The odour was so offensive that no one could lift the poor man out of bed but myself. The sailor who made up the bed became sick afterwards. The other patients had the usual serious symptoms of coloured and cramped limbs, teeth falling out, &c., until by accident, when taking a walk on snow-shoes, a red spot appeared in the snow, which, on inspection, I found was caused by cranberries, which on examination were abundant. From this moment improvement in all my patients began, and by the time the ship had been prepared for sea all the crew were fit for work, but minus many of their teeth. During two winters in the Arctic, my party lived practically without vegetables, but our provisions were fresh, and all killed by ourselves. The Eskimos largely use the contents of the deer's stomach in the winter time as a vegetable, chopping a piece off and eating it as we do bread. I strongly recommend cranberries as part of the ration, both in the Navy and in the Mercantile Marine; they are easily preserved with a little sugar.

Dr. Collingridge said:—If the paper had no other purpose than to dispel the extraordinary opinion still existing even among shipmasters and owners—the very persons affected—that the diet scale is a compulsory one, and insisted upon by the Board of Trade, it would be of value.

There can be no question as to the absolute inefficiency of the diet scale as laid down in the ordinary agreement, but one must not forget that even this is not obtained at its "paper" value.

The inspection of food as supplied to merchant ships is still practically non-existent, and some radical change in this direction is sorely needed—meat and bread especially demand careful attention in this respect. Reference to the statistics already quoted will show that the first effect of the Merchant Shipping Act, compelling the daily issue of lime-juice, was to greatly diminish the number of outbreaks of scurvy; but these same statistics will further show the tendency of shipowners from, I believe, pure ignorance and carelessness, to consider that the Legislature by this regulation has, as it were, taken charge of the health of crews, and thus relieved them of any responsibility.

It is almost a natural conclusion, if limejuice is declared to prevent scurvy and maintain men in health, that the ordinary scale ought to be amply sufficient. Thus, the number of outbreaks increased up to 1883, and the further fact that the mere recommendation by the Board of Trade of Dr. Spooner's scale shows that shipowners not only need but seek advice accentuates the responsibility of the Board.

It is greatly to be hoped that the Board, realising its duty in the matter, will take the further important step of issuing a compulsory rational scale.

This would be actually welcomed by owners, who have already given ample proof of their willingness to do anything reasonable for their employés. I would further, in reference to the figures in Table II., note that 88 per cent. of the vessels entering London carry the British flag.

The figures of Dr. Curnow are so striking, especially with reference to the incidence-rate and death-rate from phthisis among our merchant seamen, as to call for special comment.

Few facts in sanitary science are more clearly demonstrated than the immense influence of breathing foul and impure air in producing lung disease of all kinds, but especially phthisis.

The space allowed by law to the British sailor is only 72 cubic feet, and this space is not only very imperfectly ventilated, but also highly charged, in the case of lower forecastles in wooden ships, with organic impurities. The difficulty of keeping these small confined irregular spaces clean is well nigh insuperable. One has also to deal with the waste products of artificial light and heating by means of imperfect and badly constructed stoves. It is, therefore, little to be wondered at that lung diseases are so rife. It is fully time that an increased space should be given to seamen.

I would suggest 100 cubic feet as a minimum, feeling certain that, provided this were not made retrospective, there would be no opposition on the part of shipowners.

C. J. Swanston, Esq., C.B. (Board of Trade), said:—The dietary scale is not at present compulsory, and power would have to be given by Parliament before the Board of Trade could force a scale upon the Mercantile Marine. The present scale is a matter of contract between the owner and master of a ship and the crew, and the action of the Board of Trade officer is confined to seeing that the crew perfectly understand what the diet scale for the voyage is, and have an opportunity of objecting or declining to sign. The Board of Trade have taken the utmost interest in the health of the Mercantile Marine for many years past. It was at their instance that the Merchant Shipping Act of 1867 was passed, which contains special provisions for securing the health of seamen, and the reduction in the cases of sea-scurvy in recent years, shown in the tables quoted, may fairly be attributed to this measure, at least to some extent. But diet is not the only element involved in this question of health of crews. Many of the victims have been found to be men whose health had been debilitated by previous debauchery ashore; and while the healthy members of the crew have resisted the effects of unhealthy protracted voyages, bad water, or provisions run short, their diseased colleagues sometimes have fallen victims, and the ship had been classed amongst the list of scurvy cases.

The Board of Trade have, however, endeavoured in recent years to improve the arrangements connected with the discharge of seamen. Under these improvements, seamen are now able to go straight away to

their homes, instead of having to remain strangers in a seaport, subject to all the vicious attractions provided for them by the crimps. Seamen have to a very considerable extent taken advantage of the facilities now existing for proceeding at once to their homes, and it cannot be doubted that their health has improved in consequence. The reduction in the length of voyages, now that sailing vessels have been to a great extent replaced by steamships, cannot fail to have a salutary effect upon the health of seamen.

In nearly every case of sea-scurvy, official inquiry is made by officers of the Board of Trade.

Brigade-Surgeon Burton Brown said:—I consider that the subject of proper ventilation of berths on ship-board is of much importance in the prevention of scurvy. In 1858–59 I took medical charge of 250 soldiers from Gravesend to Calcutta; the voyage lasted five months and 12 days; they only touched at the Cape, and there was scarcity of water before we reached there, and of food afterwards, but no case of scurvy occurred, and no death from any disease. I attribute this to the means employed to purify the air 'tween decks by using a thermantidote, that is, a wheel carrying fans in a case, and connected with a windsail up a mast and a canvas tube between decks. A corporal's party of four worked the machine, each man for a quarter of an hour, and each party relieved every three hours. The exercise did the men good, and the air kept the 'tween decks sweet, and no scurvy occurred though the men lived on salt provisions.

Miss Helen Taylor said:—I wish to suggest the necessity of the appointment of a medical officer, a coroner, at every port, whose duty it shall be to inquire into the cause of the death of every seaman who has died in the course of the voyage on board each ship which comes into port.

We have heard here to-day how largely even scurvy is dependent on general sanitary conditions as well as on the quality of the food. Even if the Board of Trade issues obligatory scales of diet and sanitary regulations, these can be evaded, and the responsibility for the consequences on the health of the sailors thrown by the shipowners on the inefficiency of those regulations. For example, with regard to lime-juice, it is said that some of the lime-juice served out on board ship is utterly useless, either from age or original inefficiency.

It is plain that the most effectual way to secure healthy conditions on shipboard is to make the shipowner responsible for the injurious consequences of their absence. If a coroner found from the evidence of the fellow seamen that no complaints were made as to these, the matter would drop, but when there was a consensus of evidence as to unwholesome food and insufficient number of crew, exposing each man to overwork fatal to health, or to any other insanitary arrangement, then the verdict of the coroner's jury would bring home to the shipowner the responsibility through the neglect or otherwise of the death of the men on board his ship. This responsibility would quicken his zeal to secure obedience, not only to specific regulations imposed by Government, but also the sanitary conditions imposed by medical experience.

Mr. B. Tomalsuri gave the result of personal observations whilst acting as surgeon on various Japanese vessels, both emigrant and naval. In no case had he seen any case of scurvy, though the condition both as regards food and ventilation on the emigrant boats were not entirely satisfactory. He laid stress on the large proportion of vegetable

food taken by the Japanese. An outbreak of "kakké" (beri-beri) on the training ship "Ringo" was attributed to the non-sufficiency of nitrogenous food stuffs and excessive labour. Surgeon-General K. Takaki has done a large amount of work in the direction of improvement of diet, &c. on board ship. During six years' service since, Mr. Tomalsuri had seen no case of either scurvy or kakké, and he attributed this to the improvement of diet.

Dr. Spooner, replying to the remarks made on his paper, said:—Lime-juice is now all tested at Somerset House, and, therefore, the only bad juice is that taken in at foreign ports.

As to a compulsory diet scale, the Board of Trade at present has no power, but there should be no difficulty in obtaining this.

There is already an official inquiry by the Board of Trade into every death on board ship.

Notes on the Effect of Improved Sanitation on the Public Health of Seaport Towns.

BY

EDWARD WALFORD, M.D., D.P.H., Camb., Medical Officer of Health for Cardiff.

The measures which are carried out in our ports and littoral districts with a view of preventing the introduction of cholera from foreign countries are intended not only for the benefit of the places receiving the infection, but also for the protection of the country at large. These preventive measures consist, in the main, in the adoption of improved systems of administration based on enlightened principles of sanitary science.

The sanitary arrangements of these districts, which form, as it were, our first line of defence, and upon which our security from invasion must greatly depend, are matters, therefore, which concern the whole nation. These methods of prevention having, in our case, proved so effectual in regard to the saving of life from cholera and other allied diseases, we would fain see them adopted by other nations in lieu of the restrictive, inconvenient, and apparently useless regulations of quarantine. Practically, we have long since relinquished any attempt at imposing quarantine in any of our ports, and the only remnant of this system which remains is the old Quarantine Act of George III.

In the place of resisting disease by military cordons by land and by unjustifiable detentions by sea, we rely on internal sanitation, on the provision of pure water and efficient drainage, and on the removal of all decomposing and harmful impurities from the neighbourhood of habitations. The results which have attended these measures completely justify our action in this respect, and confirm our belief that, by further efforts in the same direction we shall, in time, be able to exclude Asiatic cholera from our country in the same way that we have already

excluded diseases which visited us two or three centuries ago. During the last three invasions of this disease its ravages have become less and less, and since 1866 it has never succeeded in establishing itself in our midst.

No such results can be shown to have followed the adoption of the most stringent system of quarantine; on the contrary, the quarantining countries are essentially those which cholera invades, and for the most part they are those in which sanitation makes but slow progress. The system has also, apparently, by engendering a false sense of security, retarded the execution of works of sanitary improvement, whereas the abandonment of it in England has probably been one of the most powerful of the many stimulants which the cause of sanitary reform has ever received. With the object of showing the paramount importance of hygienic measures, I would venture to lay before you a few facts gathered from the experience of one particular seaport town, as an illustration, on a small scale, of the value of sanitary precautions in protecting a community against the ravages of cholera, and of the good results which may be obtained by a rough approximation to an ideal sanitary standard. The facts themselves, although perhaps chiefly of local interest, point to conclusions which are of general application.

The town of Cardiff, to which I would refer, was at one time notorious for its heavy mortality from preventible diseases, and on the occasions of the earlier visitations of cholera to this country it suffered far more severely than the majority of English towns.

From Dr. Buchanan's well-known report on "The Results "obtained by Local Authorities in their Endeavours to Improve the "Public Health in their Districts," it would appear that during the epidemic of 1849, amongst the towns mentioned in this report, Cardiff, with the one exception of Merthyr Tydvil, suffered more than any other locality. Out of a population of 16,693, 351 deaths from cholera occurred, giving an annual death-rate of 208 per 10,000 of the population. During the same epidemic, the cholera death-rate in England and Wales was 30 per 10,000. In the towns referred to in that report the cholera death-rate ranged from 267 in Merthyr to 1 in Leicester per 10,000 persons living. The next epidemic of cholera occurred in 1854, and caused in Cardiff 172 deaths amongst a population of 22,464, equal to an annual death-rate of 66 per 10,000 of the population as compared with 11, the death-rate per 10,000 in England and Wales. In 1866 this country was visited again with cholera which caused in England and Wales 14,371 deaths, equal to an annual death-rate of 7 per 10,000 of the inhabitants. In Cardiff, amongst a population of 35,796, 44 deaths took place, giving a death-rate of 15 per 10,000.

Summarizing the above, we find that as regards England and Wales the death-rate from this disease per 10,000 persons living, which in 1849 was 30, was reduced in 1866 to 7, whilst in Cardiff the death-rate, which in 1849 was 208, was reduced in 1866 to 15 per 10,000.

In London the cholera death-rate was reduced from 51 in 1849 to 18 per 10,000 in 1866. Since this date cholera has never succeeded in gaining a footing in any part of this country, although the infection has been frequently brought to our shores. In 1884 four infected vessels came into the port of Cardiff with cases of cholera on board, and in 1885 five cases were imported into the district. These cases were dealt with in accordance with the Cholera Regulations of the Local Government Board and no further cases of the disease arose.

Turning now to another disease, which in point of causation is closely related to cholera, it would seem that the same measures which prevailed against cholera have been equally useful in protecting the community against enteric fever. Doubtless the same unwholesome local conditions which produced so heavy a mortality from cholera in former years assisted in the development of enteric fever. The disease was certainly at one time excessively fatal as shown by the average annual death-rate during the 10 years 1845–54, which was 19 per 10,000 of the population. This rate was reduced to 3 per 10,000 in the decennial period 1874–83. The death-rate from enteric fever in England was reduced during the same period from 11 to 3 per 10,000. Now what were the local circumstances which co-operated to produce this progressive immunity from these diseases? It is stated on good authority that cholera prevails in excess on the margins of rivers, where there are large seaport towns having aggregated, badly housed, immoral, and closely packed populations, that it selects low, wet, sodden, and corrupt sub-soils occupied by a dense population. Cardiff at one time undoubtedly presented some, if not all, of these characteristics. In the year 1849, at the time of the first visitation of cholera of which we possess any reliable information, its sanitary condition was as bad as possible.

The water-supply was derived from shallow wells, and was grossly polluted with excremental filth which percolated from cesspools and privies; no proper system of sewerage was in existence, and no removal of domestic refuse was attempted. The roads were not macadamized, courts and alleys were dirty and crowded, the atmosphere and the soil generally were in an unwholesome and polluted condition. A large immigration of paupers from Ireland had taken place in the previous year, and overcrowding, with its attendant evils, were frequent. The second epidemic in 1854 occurred before sufficient time had elapsed for the completion of any public sanitary works, but on this occasion the use of polluted well water was, as far as possible, prohibited in those districts chiefly affected, and a temporary supply of filtered river water substituted; a certain amount of street cleansing was undertaken by the sanitary authority at this time. Between this and the time of the next visitation of cholera, in 1866, very considerable changes had been effected in the state of the district; probably the most important of which, was the construction, in 1857, of public waterworks, and the constant supply of pure water. In 1855 the first section of a general sewage scheme was completed, and before the year 1860 the greater part of the town was

efficiently sewered, and the majority of cesspools were abolished. Shortly after this a regular system of scavenging was adopted, common lodging-houses were registered and supervised, nuisance byelaws were enacted and enforced, and, generally, the sanitary administration of the district was perfected. On the occasion of each epidemic of cholera the mortality fell chiefly on those localities in which the insanitary condition was most marked; the disease in preference selected houses and districts placed on the lowest and most unwholesome site, occupied by the poorest and dirtiest of Irish labourers, which had in 1848 been visited by an epidemic of typhus fever. Generally, the effect of improved sanitation in this town may be shown by the fact that the general death-rate, which in the 10 years ending 1854, with a population of 20,000, was 327 per 10,000, was reduced in the 10 years ending 1889 with a population of 130,000 to 197 per 10,000, and that the death-rate from the chief infectious diseases was reduced from 98 to 31 per 10,000 during the same period. Similar, and in some cases doubtless better results have followed the efforts of local authorities throughout the kingdom to improve the sanitary condition of the districts within their jurisdiction. But whilst the improved sanitary administration of our urban and rural districts has of late years so greatly benefited the public health, practical hygiene, as applied to our floating population, has, I think, in some respects, hardly kept pace with modern scientific knowledge. May not this be due, to some extent, to a system which divides the responsibility as regards health matters between three different public bodies? The Customs, the Board of Trade, and the local authorities have respectively sanitary functions devolving upon them which might, I would submit, be more efficiently performed by one undivided authority. The disadvantage of this division of labour becomes apparent on the perusal of the Reports on the Sanitary Survey of Port and Riparian Districts by the Inspecting Officers of the Local Government Board, wherein we find it recorded that "a notable number of authorities, some of them "acting for districts with a considerable amount of shipping trade, were "found to have done nothing in the way of inspection of vessels, and "that the riparian authorities generally have taken no means to ensure "the wholesome condition of vessels." Here we find that one of the most important functions of a sanitary authority was entirely neglected: the inspection of shipping, by which means only a prompt detection of the presence of infectious diseases was to be expected was not attempted, for the most part probably because these authorities did not recognise their responsibility, or because they considered that this was a matter which concerned the Customs authorities only. Then again, it must be admitted that the question of ventilation is not on such a satisfactory footing on shipboard as on land. What can be more illogical than to allow a cubic space of 70 feet as sufficient for a sailor in his sleeping apartment, and to require five times that amount for him when he resorts to the boarding-house.

Another weak point in our coast defences against disease may be mentioned. Perhaps there is no question of greater importance with regard to the shipping than that of the water supply, and yet it would seem that the legislature has generally provided no means by which a

local authority can compel the master of a ship to empty and cleanse his polluted water tank, and take on board a pure supply of water. In the case of some port sanitary authorities special powers have been conferred for this purpose by the Local Government Board, but generally the Public Health Act gives no such powers. I am not aware that any great practical inconvenience has resulted in consequence of this legal disability; but this is due doubtless to the good sense of shipowners and masters, who usually manifest the utmost willingness to carry out the reasonable recommendations of sanitary authorities.

DISCUSSION.

Councillor Solomon Cohen (Hull) said:—Whilst we have had a most important discussion on the food of sailors, I think it most essential we should pay attention to their housing; now we can, under the Sanitary Acts, compel the landlord to cleanse his property, I am pleased that power is given to make the shipowner do the same for the comfort and health of the sailor. Being a member of the Hull and Goole Port Sanitary Authority I can bear testimony to the advantage of the order, also to the vigilant and considerate manner in which the large number of emigrants coming to our port are inspected by the medical officers and inspectors, so that no person suffering from disease may pass without having the benefit of advice, and to the spread of infection being thus decreased. I am strongly in favour of one local authority in all port matters, and of making it compulsory on the Customs to render all information and assistance.

Dr. Harris very strongly supported the views put forward by the reader of the paper (Dr. Walford), and then proceeded to emphasise the necessity for the principal town on the river or in the port being the authority for the administration of sanitary matters. Dual control was an evil, and led sometimes to difficulties which could not arise if the management was in the hands of the principal authority. The dual authority had been done away with in Sunderland under a local Act of Parliament in 1885, since which time the work had been performed most efficiently. Before concluding, he alluded to Dr. Armstrong's work on the Tyne, and advised the members of Congress to visit the floating hospital there.

Dr. Stopford Taylor fully concurred with the views expressed by Dr. Walford as to the great advantage of the union of the Urban and Port Sanitary Authority. The only exception he could take was as to the alleged want of power to compel the captain, as occupier of a ship, to cleanse the cisterns and to give the crew a pure supply of water. By the Public Health (Ships) Act a vessel lying in any water within the district of any authority can be treated as a house within the district, and the powers of the Public Health Act can be applied.

Dr. Walford, in reply to the statement that a sanitary authority has power to compel a master of a vessel to cleanse his water-tanks and to furnish a pure supply, was of opinion that unless the impure water can be considered as a nuisance, the nuisance clause does not apply. In those cases where special powers are given, the 7th section of the Public Health Act gives the necessary authority.

Dental Reform in the Navy.

BY

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The Medical Department of the Navy is concerned with the medical, surgical, and hygienic treatment of some 60,000 men. It is an obvious axiom, therefore, that the Department is responsible both for the surgical and hygienic treatment of the teeth of the men under its charge. A defective condition of the teeth is a recognised cause of impaired digestion and consequent loss of health; and, further, disease of the teeth and surrounding structures must be regarded as a direct and more or less frequent cause of inefficiency and unfitness for active service.

No amount of admiration for the Department, which has done so much to extend the benefits of modern achievements in medicine, surgery, and hygiene to the men under their care can shut the eyes of the dental practitioner to the fact that it has hitherto neglected to give them the advantages derivable from the improved methods and practice of that branch of medical science known as dental surgery, except in such a way as to endorse our contention for the logical extension of this kind of treatment to the whole service.

This subject has received considerable attention at various meetings of the British Dental Association for some years past. The Association has printed at considerable expense exhaustive papers on the subject and distributed them to the various authorities. In accordance with a resolution unanimously passed at the Annual General Meeting in 1887, its Representative Board memorialized the Lords Commissioners of the Admiralty, but all without effect. I, therefore, venture to ask your favourable consideration for certain facts, which have received the endorsement of so important and representative a body as the British Dental Association as well as the approval of individual officers of the service.

The ages of the majority of those entering the navy is from 15 to 16½ years, and the 12 years' service, in conjunction with the period of preliminary training (2 years) and the possible further extension of 9 years constitute a long period of service which contrasts strongly with the short service now adopted in the army.

The Marine service is also under the care of the Navy Medical Department. The age of the recruits for this service is from eighteen to twenty-four years. The period of service is for twelve years, with the option of serving an additional nine years if his conduct is good. Artificers, too, are subject to much the same regulations.

The recruiting examination, as far as the condition of the teeth is concerned, is infinitely more strict for the navy than the similar examination for the army. The memorandum issued for the guidance of recruiting officers by the Admiralty is well worth earnest consideration.

"Memorandum for the Guidance of Recruiting Officers."

Admiralty, February 2nd, 1882.

(*a*) The loss of five teeth, absent or unsound in any degree, must in all cases be considered a cause for the rejection of boys.

(*b*) If the biting or grinding capacity be seriously impaired by the loss of a less number of teeth than five, for instance, three or four incisors, or three or four molars in the same jaw, the boy must be considered unfit.

(*c*) Beyond the above, no exact rule with respect to defective teeth can be laid down to the examining medical officer, but he should take into account the condition of the teeth generally, and the probability of their lasting.

I understand that this memorandum is still in force, with the exception that for the London District the Admiralty has extended the number of absent or defective teeth which disqualify the candidate from five to seven.

There can be no doubt that this extension of the number of absent or defective teeth to seven was imposed by the difficulty of finding a sufficient number of recruits who satisfied the higher standard as to the condition of the teeth.

With regard to paragraph (*a*) it would be interesting to know since the teeth are symmetrically disposed in the jaws both in position and number, which is the odd tooth or teeth with which the recruit can dispense.

Paragraph (*b*) is good in so far as it insists on biting or grinding capacity irrespective of the number of teeth present but the terms in which it is expressed, especially as regards the incisors, is not instructive and indicates a small acquaintance with the clinical aspect of dental caries.

Paragraph (*c*) is a proof of the opinion of the authorities as to importance of sound teeth to the sailor. It is surely, therefore, short sighted on the part of the authorities to assume that the examining medical officer is necessarily possessed of the knowledge requisite to estimate the condition of the teeth generally and the probability of their lasting.

That these regulations are not consonant with the views of the dental experts may be easily shown. The late Mr. Spence Bate, F.R.S. in a Presidential Address to the Odontological Society, while discussing the Admiralty regulations as to the teeth of the boys entering the navy, said: "Thus occasionally six teeth and not unfrequently four, might be "judiciously removed with advantage to the future healthy condition of "the mouth and the permanent utility of the teeth improved, even eight "or twelve teeth might be removed from the mouth and the person gain "by the loss, while on the other hand four teeth only might be lost and "the set made weak as a masticating organ."

Mr. Bate's view as to the twelve teeth would probably only hold good in extreme and exceptional cases, but we can only emphasize the truth of his statement as to the loss of eight teeth in many cases.

It is a well recognised fact in dentistry that owing to extensive caries of the first permanent molars, which are usually neglected under the misapprehension that they are only temporary teeth, the extraction of these teeth if performed at a proper time, promotes instead of deteriorates the efficiency of the denture in mastication, and frequently diminishes the liability to caries by relieving the remaining teeth from undue lateral pressure.

Mr. Fisher, whose name is identified with the plea for the compulsory attention to the teeth of school children, remarks: "This "dental standard of the Royal Navy for boys of 16 years or so is not "by any means too severe, when one thinks of the likelihood of their "being sent on foreign service, or, in times of warfare, for cruises of "three, four, or five years; for one observes the necessity for selecting "physical types that will endure the tear and wear common to such "a life, where the foods are all more or less hard. What the Admiralty "ought to exact is that no boy be received with decayed or decaying "teeth, not even one tooth, as this disease is now as amenable to treat-"ment as any other. Then, if so, why should they take boys with any "decayed teeth, when the weak places may be made strong by fillings, "&c.? Many healthy, strong boys with more teeth decayed than would "at present disqualify them, would then be eligible for the service, "and would prove equal to, if not surpass, their present selection."

Again, much unnecessary expense is incurred by sending up lads for examination at headquarters, which might be obviated by employing the local dental practitioner to make an examination of the teeth of recruits in the same way as the civil medical practitioner is employed.

If competent dental advisers were attached to the Admiralty Recruiting Department, I am convinced that they would soon be able to prove to the satisfaction of the authorities that they would gain by increasing, rather than diminishing, the stringency which is enforced as to the teeth of the recruits, while with efficient means which can be readily provided for the conservative treatment of the teeth, there might be a great extension of the number of available candidates. Nay, more, I am in a position to prove not only the truth of the statement but also that the authorities themselves are in the possession of the facts, though they fail to adopt the logical sequel arising therefrom.

In December 1885 the Admiralty entered into a contract with the authorities of the Dental Hospital of London, by which the latter in consideration of a subscription of 30 guineas, undertook the dental treatment of such recruits as might be referred to them during one year; and, as a consequence, 34 marines, 14 boys, and one artificer were so treated, and saved to the Service.

Unfortunately the hospital authorities have kept no separate account of the professional services rendered under this contract, and the Admiralty authorities who might give the requisite information refuse to do so. I have, however, sufficient data to prove in the following figures which I have been able to gather with regard to the amount of work done in a portion of the year 1888, that the amount of service has increased.

Recruits treated at the Dental Hospital, London, for the Lords of the Admiralty, January 7th to December 28th, 1888. 195 Patients.

Amalgam.	Osteo.	G.P.	Gold.	Cases of Advice
122	30	4	1	99

Total of work done, 256.

The Number of Patients so treated as related to age.

Years.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
Recruits -	3	32	22	20	64	27	11	7	5	3	1

Is not this a practical proof of the kind of service which dental science can render to the State? I strongly maintain, however, that it is no measure of the amount of the services which might be rendered by a proper and efficient organisation for carrying out conservative dental treatment. This is obvious from two facts :—

(1.) The treatment of the work is carried out by dental students, who are in the process of learning their profession; and, therefore, is only indicative of what might be obtained by the employment of fully qualified dental practitioners of some experience.

(2.) This arrangement is confined to only one recruiting station.

It might be supposed that this arrangement which is excellent, as far as it goes, was initiated at the suggestion of the Medical Department. As all the other officers concerned have now been changed, there can be no objection to my stating that the arrangement was entirely due to the enlightened and far-seeing action of Sir Anthony Hoskins, then one of the Lords of the Admiralty, aided by the sympathetic support of Colonel Welch, the then Superintendent of the Recruiting Station. While expressing profound satisfaction at so practical a recognition of the benefits derivable by the State from the services of the dental practitioner, we must enter a protest at the nature of the recognition. Is it fair on the part of the State to so avail itself of the advantages of a purely charitable institution, mainly established and upheld by the donations of the dental profession, instead of employing the services of fully qualified dental practitioners who, in accordance with the regulations of the State, have become so qualified by undergoing a long course of special training at a considerable cost?

Provided the services of fully qualified dental practitioners are employed, we should recommend the Government to extend the scope of the experiments to the recruiting stations throughout the country as the necessary corollary of the success of the present arrangement.

The contract with the Dental Hospital of London was all very well as an experiment, but it has now been sufficiently tested. In fact, its continuation is a manifest injustice to an honourable profession, and I believe the members of the Navy and Army Medical Departments would be the first to appreciate the unfairness of it, and now that it has been pointed out to them will do all in their power to have it rectified.

As it will be seen from the Appendix, in April 1888, the Representative Board of the British Dental Association through its Sub-Committee presented a memorial to the Lords Commissioners of the Admiralty requesting permission to examine the recruits passing through the London recruiting depôt, to collect statistics as to the condition of the teeth, and to report to their Lordships thereon, with a view to increasing the number of recruits available for the service, and thus promoting the efficiency of the Royal Navy and the Royal Marines. The reply to this memorial was to the effect that, "Their Lordships are "advised that no benefit would accrue to the recruiting of men and "boys for the navy by the adoption of this proposal, and that the "arrangements at present in force provide for all the requirements in "the matter." In consequence of this reply, the Sub-Committee took no further action in the matter.

That pressure should be put upon their Lordships to reconsider their attitude, is supported by the following statements :—

(1.) The present arrangement with the Dental Hospital of London has resulted in the addition of a certain number of men and boys to the Service who otherwise would have been ineligible candidates on account of "defective teeth."

(2.) In the opinion of dental experts this number is capable of being greatly increased.

(3.) The arrangements at present in force are a practical recognition of the necessity for the services of the dental practitioner, but that the recognition is unsatisfactory because the State is here availing itself of the advantages of a purely charitable institution, and where the operations are necessarily performed by dental students.

(4.) The present arrangement having been annually renewed since 1885, is an irrefutable proof of the kind of service dental science can render to the State, but should not be considered a full measure of the benefits derivable therefrom.

(5.) From the fact that dental surgery enters into no part of the special training of the naval medical officer at Haslar, and that it is not generally included in his medical training previous to his entering into the service, the only really competent advice their Lordships can have on this subject can be from special experts, such as has been proposed, should be appointed for the examination of the recruits.

One would naturally suppose that, since the State makes it an important matter that the recuits, on entering the service, should have good teeth, it would supply the necessary equipment, and make some

provision for insuring that, at least, some of its medical officers should be capable of watching over, and taking care of the teeth afterwards. We shall presently see that it does not do so. Many navy medical officers support the opinion that it should, but feel powerless to effect a reform.

One of the principal surgeons in the United States Navy wrote to me, that in his opinion, "It would only be a matter of time, though, when "dentists will be admitted into the navy, as their services are certainly "much required by men and officers. I had a practical dentist with "me as apothecary on the last ship I served on. He did a great deal "of dental work, for which he was paid by those on whom he operated. "Naval medical officers do not know anything about the practical work "of dentistry as far as my experience goes. . . . As it is, we exclude "those whose teeth are bad from the navy, thus doing away with the "necessity of doing work of this kind."

Though this last statement may seem contradictory to his previous assertion, that the services of dentists are certainly required by men and officers, it serves to explain the impression which apparently exists, both in the medical department and amongst the higher officials, that in consequence of the stringency of the regulations on entering the navy, there is little necessity for making any provision for the teeth of the sailor, artificer, or marine.

A short study of the clinical aspect of dental caries conclusively proves that it is essentially a disease of youth, and that the greatest ravages occur between the 16th and the 25th year. Magitot in a paper on "The Curability of Dental Caries," showed that putting aside the extractions for irregularities, anomalies, accidents of the wisdom teeth, &c., in a total of 2,000 teeth, the cures amounted to 1,980, while the extractions numbered 20, or 99 per cent. cures, and 1 per cent. extractions, and further, that the period of greatest frequency of the cases undertaken was that of from 20 to 30 years. In the case of such teeth as recruits must have, have I should say the curability of dental caries was nearer 99·9 per cent.

It is impossible, therefore, to suppose that out of the total force of over 60,000 officers and men, that diseases of the mouth and teeth are unknown. In a short conversation with a long service man now engaged in recruiting, he informed me that acute suffering from the teeth was not at all an uncommon occurrence on board ship, that as far as he knew extraction was the only treatment, and that he had never known of a sailor having had a tooth stopped, except by a civilian practitioner at his own expense. He himself had lost nine teeth in his period of service. Two had been extracted by the naval surgeon, and the other seven had been extracted by the sick berth steward. Judging from the excellent quality of his remaining teeth, it is not improbable that with timely remedial treatment he would then have had a full dental armament. I think it will be found that, in so far as extraction is concerned, as well as in other matters, the sick berth steward is the analogue of the hospital sergeant in the army.

By far the most important evidence on this subject, however, is a report made by a medical officer on the subject of "Blue Jackets' Teeth," in which he embodies a series of reliable statistics compiled while serving at the Royal Naval Barracks, Sheerness, in 1880, with a view to their being submitted to the higher authorities as showing the necessity for the employment of dentists at the large home hospitals. A step, which in his opinion, "Will soon be ripe for consideration, and cannot in this enlightened age be much longer postponed." I have been privileged to examine these interesting statistics, and to pursue his draft report, presented some years ago, and of which I shall endeavour to give you the salient features.

After referring with justifiable pride to the enormously improved health of the navy, he remarks, "Are we sure that we have done all that "lies in our power, compatible with the nature of the naval service to "prevent disease. Are there no means by which we can raise the "standard of the health of our seamen, high as it is, besides those "already employed? These reflections have led me to the conclusion "that the teeth of the men are more worthy of attention. It is "unquestionable that formerly medical officers themselves had a great "tendency to neglect the teeth of the men under their charge, and to "relegate the duties of extraction to their sick berth steward. When "serving in 1870 on board H.M.S. 'Warrior,' I was one day horrified "by the sick berth steward producing two of Lazenby's pickle bottles, "one of which was full, and the other two-thirds full of teeth, which "the men said he had extracted in 10 months, without the knowledge "of the medical officer of the ship. He was not a little proud of the "achievement, and although the time he took may have been longer than "he said, that sight made a great impression upon me. It struck me that "it represented a great amount of pain and suffering of which the "medical officials themselves had no conception, and I suppose that "ship was in no sense exceptional."

. . . . .

"Insufficient mastication of food, and consequent chronic dyspepsia with all its attendant maladies are certain and undeniable results of decayed and imperfect teeth. In the naval service a large proportion of disease is directly or indirectly traceable to bad teeth, although rarely recognised as such. Neuralgia, earache, ulcer of the tongue, and even epithelioma, odontomes, periostitis, necrosis of the maxilla, abscess, salivary fistula, empyema of the antrum, constipation and diarrhœa, dyspepsia and debility are, with exceptions, simple cases of cause and effect."[i]

After referring to the more remote effects and rarer disease forms which may be attributed to reflex irritation of peripheral nerves set up by a diseased condition of the teeth, he continues, "It is unquestionable "that a large proportion of the disease enumerated is the effect of bad "teeth, as we see them in the service, and it must be in the experience "of every observant medical officer, that men with bad teeth are more "frequently under his care than those with sound.

"From these considerations, and the opportunities afforded me while serving at the Royal Navy Barracks at Sheerness, I was led to

[i] p. 2258.

institute an inquiry by actual personal examination of the teeth of upwards of 1,000 men, limiting the investigation to blue-jackets of over 20 years of age, who had entered the service as boys, and who therefore, it was to be presumed, were of good physique and constitution, and whose teeth were in good condition at the time of joining the service."

The result of this inquiry will be found in the following tabular statement (Appendix), which I have compiled with the greatest care, and for the accuracy of which I can vouch. When it is remembered that it presents the careful examination of some 30,000 teeth, it will be admitted that the task I set myself was not a light one, and I trust that I may not be considered presumptive if I express the hope that this record may prove of some value in the future, and may ultimately lead to the adoption of measures, which will effect a reduction of suffering on the one hand, and an increased efficiency of men on the other.

"Of the total of 1,022 men whose teeth I examined, representing 32,704 teeth in the aggregate—or, deducting 1,030 teeth not erupted, 31,674 teeth—no less than 4,929 were extracted or decayed, being rather more than one-seventh of the total number of teeth, and this, considering the age and quality of the men, is strikingly large."

The analysis of his table proves that the loss is principally amongst those teeth on which the "grinding capacity" depends. The ratio being 1·55 in the incisor region, 4·35 in the bicuspid region, and 9·65 in the molar region per cent. of the total number of 31,674 teeth, and therefore not including the 1,030 third molars which were absent.

He continues—

"What is the cause of this high rate of destruction among the teeth of our blue-jackets? These men are carefully selected for the service at a time when it may be safely assumed that the teeth are invariably sound and good, and yet, before completing his 21st year, the boy will certainly have on the average more than three bad teeth, and at 40 years of age nearly eight.

"There are in the Royal Navy three great causes always acting to produce this deterioration of the men's teeth :—

"(1.) Want of cleanliness.

"(2.) Want of employment for the teeth.

"(3.) Insufficient professional attendance to the teeth.

"(1.) As regards the want of cleanliness, we are familiar with the fact that decay of the teeth commences externally, or, in other words, first shows itself on the enamel, and in most cases is the result of chemical action produced by the decomposition of particles of food that collect or lodge in interstices or depressions of the teeth while eating. I need not enlarge on this, as it is undisputed that neglect to clean the teeth encourages the formation of acid, the accumulation of tartar, and so seriously injures the teeth. The remedy of that is, of course, the use of a tooth brush, or better, of a pointed stick of soft wood to be used by friction up and down after the manner of the natives of India.

"How many blue-jackets clean their teeth from one end of the year to the other?

"(2.) The idea of the want of employment for the teeth may raise a smile when the regulation 'hard tack,' so much in use in the serviee, is borne in mind. But it is this very 'hard tack,' in my opinion, which is the main cause of the deterioration of our men's teeth, for in eonsequenee of the hardness of ship biseuits, the men soak them in their tea and then bolt them without mastication, and, as this kind of food contributes two of the three daily meals when at sea, the teeth are but very inadequately used.

"(3.) As to the insuffieient profcssional attention to the teeth, this cause cannot be denied, as at the present time there is absolutely no professional attention paid to the teeth. I would suggest that, at the large home hospital of Haslar, Plymouth, and Chatham, skilled dentists be permanently attaehed, whose sole duty should be to attend to the teeth of the men. Is this an unreasonable proposition? Is the Royal Navy always to be in the rear of advancing art, and are we always to be the last to adopt sueh means as seience has plaeed at our disposal for the alleviation of human suffering?"

After referring to the remarkable advanee in modern dentistry, and the professional curriculum now required of the dental practitioner "who now takes his plaee beside ourselves," he continues, "and is the Royal "Navy in this respeet to eontinue in the same condition as it was 40 "years ago? I trust and believe not. Dentists at the home hospital "are necessary, and the time is ripe. It is inevitable that sooner or "later effieient dental treatment must be provided. It will be true "economy in the end. How many men date their deterioration of "health from bad teeth which might have been prevented by the "early attention of a dentist? How many men have ultimately been "invalided at a great eost to the eountry, and how many men have "died beeause their teeth were allowed to deeay and ruin? No man "ean tell, but my insinuations are none the less true, and remedy—the "only one—is the induction of skilled dentists into the home hospitals.

"It may seem to you, as it does to me, that it would be diffieult to exaggerate the value and importanee of sueh a report, coming, as it does, from a medical offieer of long serviee and high rank, and, therefore, absolutely beyond the faintest suspicion of being put forward from any self-interested motives. The Department, however, apparently showed its appreeiation by pigeon-holing it 'pour encourager les autres.'"

With regard to hygiene of the mouth, which is evidently from the foregoing report so much neglected in the navy, I should like to record another instance of the eonventional attitude of Government officials to obvious reforms and common-sense proposals. The secretary, on behalf of the Medieal Committee, of the National Dental Hospital, offered to supply the Admiralty gratuitously, for distribution amongst the men, with a large number of eopies of a few brief rules as to how the mouth and the teeth should be eared for so that earies might be prevented. The proposal was eourteously but firmly declined.

Another and very important piece of evidenee in support of our eontention, may be derived from the Annual Statistieal Report of the

Health of the Navy, published by the Department itself. It would be a vain effort to distinguish many of the diseases which do arise from defective teeth by an examination of the various diseases as tabulated in these reports. By singling out one, viz., dyspepsia, of which defective teeth is a well-recognised cause, there is abundant proof that loss of the teeth is a recognised cause of invaliding. By examining the details given under the head of diseases of the digestive system in the report for the year 1888, we find that at the—

(1.) Home Station. (Mean force, 24,000.) "Loss of teeth" was the cause of invaliding in three cases, dyspepsia in one. Cases of dyspepsia, no return.

(2.) Mediterranean Station. (Mean force, 5,800.) Out of the 13 invaliding one of these is returned as for "loss of teeth." Cases of dyspepsia, 120.

(3.) North America and West Indies Station. (Mean force, 2,600.) No detailed returns. Cases of dyspepsia, 75.

(4.) South-East Coast of Africa Station. (Mean force, 550.) No detailed returns.

(5.) Pacific Station. (Mean force, 1,480.) Twenty-nine invalided, one was for "defective teeth and resulting dyspepsia." Cases of dyspepsia, 43.

(6.) West Coast of Africa and Cape of Good Hope Station. (Mean force, 1,800.) No detailed returns.

(7.) East Indies Station. (Mean force, 2,280.) No detailed returns.

(8.) China Station. (Mean force, 3,950.) Seventy-eight invalided, "four for dyspepsia, &c., dependent on defective teeth." Cases of dyspepsia, 91.

(9.) Australian Station. (Mean force, 2,000.) Thirty-two invalided, one for dyspepsia, &c., due to defective teeth.

(10.) Irregular force. (Mean force, 5,600). Cases of dyspepsia, 109.

Here we have evidence of 439 cases of dyspepsia from returns of only a portion of the fleet, and from another part of the return we find that there were at least 813 cases. The most important point for our present purpose is that from the returns of only a section of the fleet we find that 12 men were invalided on account of defective or loss of teeth. This condition of affairs seems clearly to indicate that the suggestion with regard to the appointment of dental practitioners to the Home Station will not be sufficient, and that similar appointments should also be made at the headquarters of each of the foreign stations.

When afloat, a naval surgeon has to provide all his own instruments according to a list which includes a case of extracting instruments; on shore the Department provides instruments, but as there are no regularly published regulations containing the details of equipment as in the case of the army, one is unable to assert anything definite as to the dental equipment, except that the "tooth-stopping case" included in the Army Medical Regulations is not provided.

A knowledge of State dental equipments warrants one in expecting to find, in this as in other departments, that the forceps are sometimes better calculated to snap off the crown than to extract the tooth; that the excvators, instead of being solid complete instruments in themselves, consist of a variety of blades, fitting into a common handle, and that the prehistoric tooth key is an invariable item in the dental equipment. One would be safe also in asserting that examination instruments, the mouth mirror, the probe, and the dressing forceps, would be conspicuous by their absence.

One would naturally suppose that since the Department insists upon the naval surgeon possessing a dental equipment, that it would also make sure of his possessing some knowledge and training in the use of these instruments. The naval surgeon undergoes a period of special training at the Royal Naval Hospital, Haslar, but dental surgery and dental operations form no part of their course, although the Department must be perfectly well aware of the fact that dental training is not generally included in the medical training of the candidate before entering the service. One day it will be recognised that no medical training can be really complete while it totally ignores the elements and principles of dental pathology and surgery; but meanwhile the Medical Department should exact from the naval surgeon, before he takes service afloat and probably abroad, the power to relieve the commonest and one of the most painful diseases to which the sailor is exposed, and that without resort to the often unnecessary torture of extraction.

The question of attention to the teeth of the men who constitute that important body known as the Royal Naval Reserve might also well occupy our time, but I trust sufficient has been already advanced to prove that it is of national importance that similar provision for remedial treatment should be made for them. I shall therefore content myself by quoting a passage from a paper by Mr. Fisher, of Dundee, who has distinguished himself by his energetic and persistent advocacy not only for the necessity of dental appointments in the Royal Navy, but also for the compulsory attention to the teeth of school children; especially from its important bearing on admission into the army and navy.

"The Royal Naval Reserve consists of 30,000 men, made up of seamen drawn from the Mercantile Marine Service, 20,000 of whom are known as first class men, and 10,000 as second class men. I need not enumerate the qualifying distinctions, but no sailor can now enter this service, or even rejoin—which he does every fifth year—who has lost from five to seven teeth, and this means, in money, to the first class men, 10*l.* 5*s.*, and to the second class men 8*l.* per annum, with medical and other advantages while on duty. I entered into this pretty fully in my last paper, therefore I need not recapitulate, but draw attention to the new class of men the Royal Naval Reserve are now enrolling, namely, firemen or stokers for their large steamships, this class receiving 6*l.* per annum as a retaining fee, with no drill. Since the establishment of the firemen class in December 1885, out of 320 applications for enrolment, 36 have been rejected on account of defective teeth, from

the reports which are deposited in the London central office. In all probability there would be more than that, as the local secretaries of the Mercantile Marine Boards very often answer the men thus—'Oh! you 'are defective in the teeth, and you need not go to the doctor, as you 'would not be passed,' and hence there are numbers of men who are never entered in the books."

The treatment of this subject would not be complete without some allusion to its economic features. I shall do so, however, very briefly but very effectively by a quotation from the address of the President of the British Dental Association, at its last annual meeting, in which the position of dentistry with regard to public services formed the principal subject. I should also state that it is to him, Mr. Browne-Mason, of Exeter, that I am indebted for access to the report of the naval medical officer, from which I have so largely quoted.

"That this addition of qualified dental surgeons to the staff of the army and navy medical departments would entail a very slight outlay on the part of the nation in comparison with the gain that would accrue, I have no sort of doubt, and the nation would be repaid over and over again by the increased length of time we should find the men serviceable. The statistics of work and cost of the same furnished by the reports of our dental hospitals show at what a comparatively little cost, over and above the pay of such officers, such a service could be maintained, for, commensurate with the benefits conferred, no medical charities cost so little, there being no expenses for maintenance of patients, and I assert that it would be a national disgrace if such an outlay were grudged by Parliament, even if the reasons for calling it into existence were humanitarian only, instead of being, as they are, eminently utilitarian and economic."

In conclusion, I trust that you will admit that a strong case has been made out for adoption of some method of dental reform in the Navy Medical Department. It is evident that such reform is not likely to arise spontaneously within the Department itself. The advantages of reform are so obvious that I trust you will individually and collectively do what you can to promote such reforms in the interests of the State, and from a feeling of humane consideration for those who are defending our country both in peace and in war at the risk of loss of health, if not life itself.

I would therefore ask your support for the following resolution :—

That, being of opinion that, wherever the States provides medical services, dental services should be provided for as an essential part of such medical provision, and having regard to the great importance of securing competent attention to the teeth of the navy, this Section of the Seventh International Congress of Hygiene and Demography would urge upon the Government the advisability of making suitable provision to that end.

DISCUSSION.

Brigade-Surgeon Hector said that, having listened attentively to the paper just read, he was of opinion that such a thinly attended meeting would not be justified in passing a resolution urging the Government to incur expense in the matter.

Professor Lane-Notter said:—I regret that some naval officer is not present who could give us some information on this subject. I have never found it difficult to obtain any instrument in the army, and I think in so small a meeting as this that it would not be advisable to pass such a resolution as is suggested.

Surgeon-General Marston said that he thought before any resolution of the kind was put, the meeting should consider its practical bearing and the possibility of its application to our large public services, naval and military, distributed over all parts of the world.

The resolution proposed was not seconded, and so fell to the ground.

Projet du nouvel Hôpital Militaire de Madrid.

PAR

Don Modesto Martinez Pacheco, Madrid.

C'est uniquement comme preuve de respect et d'adhésion que je me permets de présenter aux illustres membres de ce congrès quelques travaux qui ont rapport aux points soumis à la discussion.

L'hygiène compte en Espagne des partisans fervents et enthousiastes, non seulement parmi les médecins, les architectes, les ingénieurs et autres personnes de diverses professions libérales, mais aussi parmi les hommes éminents qui dirigent le pays dans les sphères gouvernementales; et tout porte à croire que sous peu de temps on pourra réaliser beaucoup de projets destinés à améliorer les conditions de la vie, et même l'allonger, soit à la ville, soit à la campagne.

Le premier travail que j'ai l'honneur de soumettre à votre illustre attention est le projet du nouvel hôpital militaire de Madrid approuvé par le gouvernement, et qui est en voie d'exécution. Tous les problèmes relatifs à l'hôpitalisation militaire ont été l'objet de profondes études, et résolus suivant les opinions de beaucoup de personnes que forment part de cet congrès. L'emplacement, l'orientation, la ventilation, la caléfaction, l'évacuation des eaux fécales et les plantations ont été décidés selon l'expérience de Messieurs Flirn, Liebermeister, Planat, Adolfo Vogt, Emilio Trelat et autres savants.

Pour les matériaux de construction, on a suivi les idées émises par Messieurs Lang, Pettenkofer, Schloesing, Muntz, Tollet et autres célébrités.

Pour l'approvisionnement des eaux potables, on a examiné l'opinion de Humbert, Köning, Poppe, Fanning et autres hygiénistes. En résumé, on a étudié tous les principaux hôpitaux d'Europe et d'Amérique, et nous croyons que le digne chef du Génie militaire, Mr. Cano y Leon, auteur du projet (dont il est juste de mentionner le nom, en vue des nombreuses preuves de compétence qu'il a données et de son enthousiasme pour la question d'hygiène) a réussi à réunir les principes hygiéniques les plus rigoureux dans le nouvel hôpital militaire. Je crois que c'est une étude digne de votre attention.

En même temps je me permettrai de vous présenter ces cartes du paludisme dans l'armée espagnole, grossièrement tracés de la main de nos soldats qui sont infirmiers militaires, *sanitarios*, et qui, à défaut de tout mérite artistique, ont au moins celui de l'exactitude et la véracité dans les chiffres. Dans les provinces du Levant et du Midi d'Espagne, règne le paludisme qui atteint les troupes en garnison dans ces provinces.

Thursday, 13th August 1891.

The Chair was successively occupied by
The Vice-Presidents of the Section.

Considérations sur l'age qui convient mieux au Service Militaire.

par

le Dr. Dimitrescoy, Bucarest.

Je viens au milieu de ce savant congrès d'un pays bien lointain "*La Roumanie*," pays qui possède une population de râce latine, et qui a été émancipé depuis près de 50 ans à peine.

Le développement de ce pays par rapport social, économique, et industriel a pris un effort considérable. Les progrès réalisés dans le développement de ces institutions, notre pays a pu les obtenir dans peux d'années, alors que d'autres n'ont pu les réaliser qu'après de longs siècles. L'agriculture est la source des richesses du pays, et ses produits partout aprécies sont transportés sur toutes les places de l'Europe.

Bucarest, capitale du pays, a subis un embellissement notable, grâces aux constructions modernes; elle possède aujourd'hui des boulevards spacieux, éclairés à la lumière électrique, des jardins, une eau filtrée, et des larges canalisations, qui font d'elle une ville saine, et belle, aux portes de l'Orient.

Son armée puissante, bien organisée, est commandée par des officiers ayant fait leurs études dans des écoles spéciales du pays et de l'étranger, a pour chef suprême Sa Majesté le Roi, qui pendant la dernière guerre Russo-Roumaino-Turque de 1877 est sortie victorieuse, faisant triompher la nation. Et c'est grâce aux différentes transformations qui ont été faites dans son organisation, conformément au progrès, qu'on a pu arriver à atteindre l'idéal d'avoir le plus de combattants possible, dont l'effectif de guerre, armée permanente, reserves et milices, peuvent être calculés mathématiquement.

L'élément territorial qui forme le noyau de l'armée a donné les meilleurs résultats, non seulement au point de vue économique, mais encore au point de vue sanitaire. Et cette organisation est due seulement à notre système de recrutement.

Notre loi du recrutement est basée sur le principe "que tout " individu valide de 21 à 37 ans est obligé de porter les armes."

Le recrutement se fait par communes, arrondissements, et districts (départements).

Les jeunes-gens qui tirrent au sort les premiers numéros, sont destinés à servir dans les cadres de l'armées active, les autres dans la territoriale, étant appelés à des époques déterminées, pour leur instruction.

Les observations médicales retenues de cette organisation sont: Une réduction énorme de la morbidité et mortalité, due au bien-être du soldat de se trouver près de son foyer; et une économie importante au budget de l'Etat. L'armée permanente, qui est agglomérée dans les casernes des grands centres des populaces, encombre les hôpitaux, augmentant ainsi le nombre de la morbidité et de mortalité, et occasionant en même temps de grands frais à l'Etat.

Dans presques tout les pays, et même dans le nôtre le recrutement se fait à l'âge de 21 ans.

Des chiffres statistiques puisées des rapports officiels du Ministère de la Guerre, dressées sur le rapport que j'ai l'honneur d'annexer ci-joint sur une période de dix ans, on constate que la quatrième partie des nombres des jeunes-gens préposés au recrutement, sont repoussés par les médecins comme n'étant pas sufisamment développés, au point de vue du physique; et renvoyés ainsi à un nouvel examen dans deux années successives.

Ces dates énormes ont fait l'objet d'une sérieuse étude de la part de nos médecins militaires; et souvent on se pose la question "quelles sont les causes qui empêchent et entretiennent l'incomplet développement des conscrits?"

Il fût un temps où on les attribuait à la syphilis, à la malaria, ou à l'alcoholisme, qu'on accusait d'être les germes destructeurs de nos jeunes générations.

Aujourd'hui les théorétieiens invoquent d'autres eauses, eomme le surmenage agrieol pour la population des plaines, et la pelagre pour nos populations montagnardes, ainsi que le surmenage intellectuel au détriment du physique pour eette des villes.

Les études entreprises dans notre armée, depuis plusieures années, pour la taille, eapaeité thoracique, foree dynamétrique et spyrométrique ainsi que pour la pesanteur du eorps, ont demontré d'une manière indubitable que la plupart des jeunes-gens appelés à former le eontigent se trouvent dans le eas d'être ajournés eomme insuffisamment développés à l'âge de 21 ans.

Les hommes reerutés sans avoir l'organisme suffisamment développé ne peuvent résister au serviee militaire, surtout eeux qu'on destine à l'artillerie et la eavalerie : ils tombent faeilement malades, en contractant des maladies eaehectiques, surtout la tubereulose, et grandissent de eette façon le nombre des eongédiés et reformes.

Si la tubereulose est ainsi l'apanage des reerues des easernes, elle est en même temps la mortalité des hôpitaux. Nous ne pouvons pas ineriminer nos easernes, qui sont pour la plupart eonstruites dans des conditions hygiéniques, ear nous eonstatons qu'avee toutes les améliorations qu'on introduit journellement dans les easernes et l'hygiène du soldat, les eas de tubereulose arrivent de plus en plus fréquents.

Nous n'avons plus aujourd'hui dans nos easernes les épidémies meurtrières de variole et de fièvres typhoïdes qu'on eonnaîssait jadis, grâee à la vaeeination et révaeeination qui est obligatoire dans notre armée, et au larges eanalisations, ainsi qu'aux bonnes eaux potables. Nous ne pouvous malheureusement pas en dire autant pour la tubereulose, eontre laquelle malgré toutes les mesures hygiéniques qu'on applique et dont la diffieulté d'applieation est fort grande.

Dans notre hôpital militaire eentral de Buearest, nouvellement batti, et avee beaueoup de soins pour pouvoir le dotter de tout ee que l'hygiène a de plus perfeetionné jurqu'à nos jours, nous avons pu faire d'importantes observations eliniques sur la tubereulose, et nous sommes eonvaineu que eette maladie meurtrière a la prédileetion exelusive de se développer à l'âge de l'adoleseenee, lorsque l'organisme est surmené et la misère physiologique grave. Malgré toutes les exigenees de la guerre modernes, nous ne voyons plus aujourd'hui dans les rangs de l'armée ees eonstitutions athlétiques et vigoureuses du soldat de jadis ; les progrès de la civilisation moderne, out tout changé, tout réduit ; même la matière animale en la changeant dans du beau et sublime . . . . .

Pourquoi, alors, nous, les représentants de la scienee, ne déelarons-nous pas à haute voix où est le mal ? Pourquoi ne demandons nous pas à nos pays, à nos gouvernements, de donner aux armées des hommes formés, des vrais soldats, à un age plus avaneé, âfin qu'ils puissent mieux résister au serviee militaire, et lutter eontre tant de causes dépressives, tant d'agents morbifiques, dont leur foyer se trouve et se développe si facilement dans l'armée ?

Cette importante question d'actualité se trouve-t-elle donc en contradiction avec nos lois civiles et sociales ?

Nous pensons qu'avec la réduction du terme de service actif en vigueure aujourd'hui, ces arguments ne pourons plus être évoqués ; d'autant plus que les pays ont besoin d'hommes forts, et les charges restant les mêmes.

Sur ces considérations notre Ministre de la Guerre a décidé la dispersion de l'armée permanente, et son incorporation dans la territoriale, laissant aux armes spéciales les soins de terminer leur instruction dans les casernes.

De l'étude de ces questions qui sont basées surtout sur les dates statistiques du tableau ci-joint, aussi que de la proportion numérique qui en ressort, nous formulons les suivantes déductions :—

1°. Que la population de notre pays augmente, et que cette augmentation est observée surtout depuis un quart de siècle.

Ce bon résultat est dû au manque de proletariat, de célibatariat parmi la population rurale (aussi qu'au pouvoir de fécondation de l'élement roumain), qui est surtout favorisé par le climat et par le bien-être de la population.

L'organisation gratuite de l'assistance publique avec de nombreux médecins, ainsi que l'instruction obligatoire et gratuite, contribuent égallement à cette favorisation.

En tenant compte de toutes les imigrations des nations étrangères qui se sont introduites dans notre pays, duent à notre développement économique, nous voyons que la population a augmenté de 800,000 âmes en dix ans, et on peut déduire de là, que notre population augmentera en double dans un siècle.

2°. Mais malgrè tout cet accroissement, nous constatons que le nombre de conscrits qui figurent sur les listes de recrutement ne se trouvent pas dans le même rapport d'accroissement. C'est à peine à 1 pour cent. que revient la proportion des inscrits par rapport au nombre de la population.

Nous croyons que cette minime partie provient de la cause qu'un grand nombre de jeunes-gens cherchent à se soustraire au service militaire, par le fait que les inseriptions ne se font pas dans toutes les localités d'après les actes de l'état civil, beaucoup de ceux qui immigrent restent non poursuivis dans d'autres pays.

3°. Que le nombre des conscrits par rapport aux recrutés est à peine de 50 pour cent. ; cette proportion tend à augmenter. Une des causes qui donne ce grand nombre est égallement celle des trops de dispenses prévues par notre loi de recrutement.

4°. Le nombre des ajournés comparé à celui des examinés, surpasse en général la proportion de 50 pour cent. ; et si à ce nombre nous ajoutons celui des refusés après leurs arrivées au régiment comme mal recrutés, nous arrivons à une proportion d'ajournés, bien supérieure.

5°. La proportion des conscrits exclus pour infirmités incompatibles au service militaire en rapport aux examinés, nous voyons qu'elle varie entre 10, 8, et 6 pour cent.; cette proportion tend à diminuer, ce que prouve que les secours de l'assistance publique se font sentir, et à la population rurale. Les infirmités les plus fréquentement constatées sont:—

Les affections de l'abdomen, et des extrémités (hernies et déformations) observées plus souvent chez les ruraux, et les prédispositions à la tubercuIose et la serofulose chez les urbains.

6°. La taille des conscrits, en général, semble diminuer sensiblement; la taille moyenne et celle que l'on constate le plus souvent, la taille haute devient de plus en plus rare, et le plus souvent elle se trouve au détriment du développement de la capacité thoracique. Si nous considerons la taille en rapport à la capacité thoracique, nous trouveront que la dernière représente la moyenne la moieté plus 0·02 ctm. par taille.

Les considérations exposées jusqu'ici, basées sur des dates statistiques puisées dans les 10 dernières années, nous portent à la conclusion que dans notre pays les jeunes-gens appelés à former les contingents des armées ne se trouvent pas suffisament dévelopés à 21 ans.

L'évolution du complet développement organique ne pouvant se faire qu'à 25 *ans; celle-ci donc est la date qu'on devrait considérer comme légale pour l'armée.*

C'est aux médecins militaires qu'incombent done les charges de signaler les inconvénients du reerutement à un âge précoce; et d'intervenir auprès des Gouvernements respectifs, d'aviser à la modification de la loi, dans le sens d'obtenir l'allegèrement des charges que supportent les citoyens par l'appel qu'on leur fait de payer à la patrie sa dette de sang.

TABLEAU STATISTIQUE sur le RÉSULTAT des OPÉRATIONS du RECRUTEMENT en ROUMANIE pendant une PÉRIODE de 10 ans, de 1881–1890.

Classement des Opérations.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.
La population du pays d'après le dernier reçensement.	5,278,535	5,286,147	5,293,890	5,304,569	5,326,401	5,400,913	5,465,027	5,780,067	5,808,870	6,001,738
Les jeunes-gens ayant 21 ans révolus inscrits sur les listes do recrutement.	57,660	53,211	57,697	56,749	54,318	60,027	55,608	58,747	57,517	59,761
Les jeunes-gens examinés pour la santé.	49,119	47,148	50,270	49,815	46,324	52,636	48,708	49,516	49,815	52,309
Les jeunes-gens recrutés étant présents.	25,345	22,810	27,105	28,686	26,346	30,012	28,198	26,580	24,882	24,982
Les jeunes-gens recrutés en absence.	3,408	2,203	3,404	5,568	3,149	3,462	3,247	4,688	3,722	3,723
Les jeunes-gens ajournés pour la 1ère fois d'après la loi.	5,139	7,630	8,653	7,553	8,072	9,125	6,954	9,061	9,084	2,313
Les jeunes-gens ajournés pour la 2ème fois d'après la loi.	1,832	1,487	1,946	1,803	1,868	2,121	2.449	2,524	4,160	4,305
Les jeunes-gens exclus définitivement pour des infirmités incompatibles avec le service militaire.	6,082	5,606	5,110	4,110	2,957	3,522	3,598	3,637	3,704	4,227
Les jeunes-gens destinés pour le service auxiliare.	327	203	168	393	1,515	2,066	2,038	1,968	2,483	3,472
Les jeunes-gens exclus définitivement, n'ayant pas la taille réglementaire de 1 mètre 54 centimètres.	659	747	368	298	282	92	185	59	50	23
Les jeunes-gens dispensés pour divers motifs légaux.	15,196	12,728	11,067	9,751	10,078	9,672	8,974	10,526	9,539	9,675
Déductions de Statistique démographique.										
La proportion pour 100 jeunes-gens inscrits sur les listes, par rapport à la population.	1,4 %	1,03 %	1,4 %	1,3 %	1,1 %	1,6 %	1,09 %	1,09 %	0,95 %	0,95 %
La proportion pour 100 jeunes-gens recrutés par rapport à ceux qui ont été examinés.	51 %	48 %	54 %	57 %	57 %	57 %	58 %	54 %	50 %	48 %
La proportion pour 100 jeunes-gens exclus pour des infirmités par rapport à ceux qui ont été examinés.	12 %	12 %	10 %	8 %	6 %	6 %	7 %	8 %	7 %	8 %
La proportion pour 100 jeunes-gens ajournés par rapport à ceux qui ont été examinés.	15 %	20 %	21 %	18 %	21 %	21 %	19 %	26 %	26 %	28 %
La proportion pour 100 jeunes-gens, sur les exclus dispensés et ajournés en total par rapport aux hommes inscrits sur les listes de récrutement.	50 %	53 %	47 %	41 %	46 %	44 %	43 %	47 %	50 %	52 %

Tableau Statistique—*continué.*

Classement des Opérations.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.
Déductions sur la taille et la capacité thoracique.										
La taille des jeunes-gens examinés, varie entre minimum et maximum de	1 mètr. 56 1 „ 73	1 mètr. 55 1 „ 73	1 mètr. 55 1 „ 73	1 mètr. 55 1 „ 73	1 mètr. 56 1 „ 74	1 mètr. 55 1 „ 72	1 mètr. 55 1 „ 73	1 mètr. 55 1 „ 72	1 mètr. 54 1 „ 72	1 mètr. 54 1 „ 71
La capacité thoracique des jeunes-gens examinés varie entre minimum et maximum de	0·78 0·93	0·80 0·93	0·79 0·92	0·79 0·93	0·79 0·92	0·79 0·94	0·80 0·93	0·79 0·93	0·78 0·93	0·78 0·92
La taille en rapport avec la capacité thoracique est de	taille 1·65 cap. thor. 0.84	taille 1·65 cap. thor. 0·85	taille 1·65 cap. thor. 0·85	taille 1·65 cap. thor. 0·86	taille 1·65 cap. thor. 0·86	taille 1·66 cap. thor. 0·85	taille 1·64 cap. thor. 0·86	taille 1·65 cap. thor. 0·86	taille 1·65 cap. thor. 0·86	taille 1·65 cap. thor. 0·85
Les infirmités qui ont doné lieu à l'exclusion du service militaire.										
Maladies de la tête	340	256	265	200	163	194	186	183	215	206
„ du système nerveux	202	174	159	183	144	117	146	187	186	172
„ des yeux	450	468	411	255	249	277	297	377	287	221
„ du nez et des oreilles	102	192	152	163	90	126	112	116	104	176
„ de la bouche	145	132	120	125	70	55	70	73	58	71
„ du cou	339	577	521	101	204	209	144	208	185	263
„ du thorax	468	336	271	136	144	195	194	175	233	385
„ de l'abdomen	990	723	822	673	495	595	680	621	684	893
„ des membres	1,572	1,441	1,251	1,024	807	775	608	629	539	578
Cachexies scrofuleuses et tuberculeuses.	446	428	379	406	444	487	521	527	564	656
„ de la malaria	2	8	2	6	3	14	18	11	13	19
„ syphilitiques	5	17	8	9	3	6	11	10	13	23
„ pélagreuses	18	28	11	9	52	10	6	4	11	16
Constitutions débiles (la misère physiologique).	963	969	530	336	215	274	246	387	356	402
Développement incomplet du corps.	139	26	118	85	111	109	125	102	138	146

Enteric Fever in the European Army in India; its Etiology and Prevention.

BY

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Enteric fever, as regards its frequency and diffusion, marks widely its difference to all other forms of disease; it knows no geographical limits, and its very universality and infectiveness makes it one of peculiar interest to medical officers of the British Army, who, serving in various parts of the world and under varying conditions of climate, have ever to contend against this disease, often assuming, as it does, an epidemic form.

In India, the subject is one of special interest, inasmuch as there is a widespread belief, founded on a general impression—that most fallacious of all tests,—that enteric fever, although it has existed for many years in that country, has of late increased in spite of sanitary improvements, and of the vast sums of money expended by the State to place the soldier in the best possible position to withstand the effects of a tropical climate, and that the mortality each year is greater, rendering service there more hazardous than formerly.

A careful examination of the statistics bearing on this subject and published in the various reports shows that, notwithstanding the increase in the enteric fever death-rate, there has been a steady and regular diminution in the general mortality of the army serving in India, so that, although the deaths from enteric fever have increased, the general health of the soldier has greatly improved. This is seen from the following table, which gives the average annual mortality per 1,000, in different periods, during the present century.

Average Annual Mortality per 1,000 of European Soldiers in India, in different Periods.

1800–1830	84·60
1828–1844	54·09
1830–1856	56·70
1869–1878	19·30
1879–1888	16·02

In 1888 the death-rate was only 14·84 per 1,000, the slight increase over other years in the last decennial periods being due to heat-stroke, respiratory diseases, malarial fevers, and alcoholism, while there was no increase or diminution in the enteric fever death-rate as compared with that in the previous year.

In the statistical returns for India, typhoid fever first appeared in 1861, but in the tables for the decennial period 1860–69 all deaths from this disease were included under "remittent and continued fevers." In

the decennial period 1870–79, the figures are probably far from correct, owing to differences of opinion as regards diagnosis.

During the ten years 1870–79, the mortality from enteric fever in the army of India averaged 2·03 per 1,000; during the six years 1880–85 it was 2·98; in 1887 it rose to 3·76; and in 1888 it was 3·75. This increase has been most marked in the Bengal and Bombay Presidencies; in Bengal the mortality was 2·28 per 1,000 in 1870–79, and 4·15 in 1888; in Bombay these figures were 1·75 and 4·04 respectively; the Madras Presidency gave 1·42 in the former period, and in 1888, 2·26.

But an important fact to be noted is that, concurrently with this increase in enteric fever mortality, there has occurred a decrease in the mortality from intermittent, remittent, and simple continued fevers.

Thus, in 1870–79, in India as a whole, the rate from these fevers was 1·42 per 1,000; in 1880–85 it was 1·02; whilst in 1887 it fell to 0·74, and in 1888, 0·73. This decrease was likewise most marked in Bengal and Bombay; in Bengal the mortality fell from 1·74 in 1870–79 to 0·34 in 1888, and in Bombay from 1·14 to 0·34 per 1,000. In Madras, on the other hand, the ratio of 0·62 in 1870–79, though it fell to 0·22 in 1880–85, and to 0·51 in 1887, rose to 2·19 in 1888. These figures are shown in the following table* taken from the Sanitary Commissions for India Report for 1888 :—

	During 1870–79.		
	Enteric Fever.	Other Fevers.	Total of both.
Army of India - -	2·03	1·42	3·45
„ Bengal - -	2·28	1·74	4·02
„ Madras - -	1·42	0·62	2·04
„ Bombay -	1·75	1·14	2·89

	During 1880–85.		
	Enteric Fever.	Other Fevers.	Total of both.
Army of India - -	2·89	1·02	3·91
„ Bengal - -	3·18	1·08	4·26
„ Madras - -	1·79	0·22	2·01
„ Bombay -	2·77	1·55	4·32

* "Other fevers" include intermittent, remittent, and simple continued fevers.

	During 1887.		
	Enteric Fever.	Other Fevers.	Total of both.
Army of India - -	3·76	0·74	4·50
„ Bengal - -	4·09	0·76	4·85
„ Madras -	2·98	0·51	3·49
„ Bombay - -	3·40	0·90	4·30

	During 1888.		
	Enteric Fever.	Other Fevers.	Total of both.
Army of India - -	3·75	0·73	4·48
„ Bengal - -	4·15	0·34	4·49
„ Madras - -	2·26	2·19	4·45
„ Bombay -	4·04	0·34	4·38

The most obvious explanation of this increase in enteric, and concurrent decrease in other fevers is that it is owing to difference in nomenclature, that is, that deaths formerly returned as from remittent are now returned as from enteric fever.

This explanation is no doubt in part true; with increasing care and attention to diagnosis and to the fact that the presence of enteric fever in India is now universally admitted, it is extremely probable that there should be an exchange of cases from a "simple continued" and "remittent" column to an "enteric" column; but that this will not account for all the increase is evident. Other factors are also present, the chief of these is the large proportion of the young soldiers now serving in the country compared with the number so serving in former years.

The increased predisposition at an early age is now universally admitted as a character of the disease. During the five years 1884–88, the average mortality per 1,000 under 25 years of age was 5·61, while from 25 to 29 it was but 2·44. The larger the number of troops under 25 years, the larger therefore would be the total mortality. The proportion of men under 25 years was 74 per cent. of the total strength in the five years 1884–88; in the 10 years 1871–80, it was only 62 per cent., and the same fact was observed in the decennial period 1870–79; the mortality between the ages 20 to 25 was 4·30 per 1,000; above 25 years it was 2·20 per 1,000. The alteration of age-constitution would therefore account for some of the increased mortality. But in addition to

[1] p. 2258.

this there is an even more important factor than age in pre-disposing to the disease. The disease most frequently attacks new arrivals in the country, and, with the present system of short service, there undoubtedly is a much larger proportion of men serving in India under five years than formerly; in 1871 the proportion was 64·6 of the total number; in 1888 it was 75·8. That it is especially the newly arrived soldier who suffers from enteric fever is made evident from the following table:—

Table showing the Average Annual Death-rate from Enteric Fever in British Soldiers at different Periods of Residence.

—	First to Second Year's Residence.	Third to Sixth Year's Residence.	Seventh to Tenth Year's Residence.
1878–1887 - - -	6·7	2·1	0·7

These figures show that there is a certain immunity afforded by residence, and this appears to be much more perfect in tropical and sub-tropical regions than in higher latitudes. The protection acquired through acclimatisation cannot be denied, though what influence of its own a tropical climate has in this respect is uncertain. The increased prevalence of enteric fever in India has therefore been accompanied by, and is possibly dependent on, an increase in the number of *young* and *recently arrived* soldiers.

Among much that is doubtful, it may now be considered as proven that enteric fever, as known in Europe, prevails in India; that it owes its prevalence to the same causes in the latter as in the former region, aided by the high temperature and humidity of the climate, and that some at any rate of these causes are widely diffused throughout India, viz., polluted soil and polluted water.

The cause of enteric fever has been stated by Eberth to be due to a specific Bacillus (*Bacillus typhosus*). Klebs and Gaffky have found similar bacilli in the spleen, mesenteric glands, and in the inflamed Peyer's patches, in fatal cases of this fever. It is now considered, with great probability, to be the cause of the disease, though not as yet actually proved. Fraënkel and Simmons state that they have reproduced the disease, by inoculation, from a pure cultivation of the microbe. From a review of all the evidence on this subject, it seems that Eberth's bacillus being the actual cause, has considerable, if not almost universal, support, and this, at all events, furnishes the best working basis from a sanitary point of view.

The fate of the typhoid bacilli in soil is early extinction, particularly in the presence of moisture, great dryness, or general decomposition (saprophytic); yet, from their ability to form spores, the soil, especially if not saturated with water, and not too cold (under 60° Fahr.), offers facilities for their subsequent increase and diffusion. We are unable to

say that the soil serves as a breeding place for the virus, but we are justified in considering it to serve as a habitat for its spores, or for such resting forms as may reach it either directly from the sick or indirectly as the result of processes undergone by typhoid dejecta deposited or buried in it. The practical bearing of these considerations is to lend some confirmation or explanation of the local and seasonal differences in the distribution of typhoid fever, the dominant factors being a certain degree of soil-heat and level of soil-water.

Enteric fever in India prevails in its most virulent form chiefly in the months of April, May, and June. In these months the upper soil layers are at their driest, and have a mean temperature throughout the 24 hours of 72° Fahr. As this superficial soil becomes moist consequent on either rain or other causes, or when its mean daily temperature falls below 60°, then the disease abates.

The maximum range of soil temperature co-existent with disease prevalence is undetermined, but it is probably very high. High levels of subsoil water are co-existent with the moistness of the upper soil layer and consequent mechanical fixation, if not actual destruction, of the typhoid bacilli, as the result of decomposition or of saprophytic action. This agrees with a minimum prevalence of disease at times of considerable rise in the soil-water.

The condition of loose or porous soil after a fall in the soil-water and consequent access of air to the soil interspaces, to say nothing of increased heat, establishes facilities for the virus (now become potent, whether as spore or not) to be carried into the atmosphere with the upper soil layer, either as dust or with ascending air currents.

Without going so far as to say that any fluctuations of the subsoil water have no effect as mechanical agents for the introduction into wells of the typhoid spores or virus which may happen to be lodged in the soil, yet, in the light of what we know to be the behaviour of the specific typhoid bacilli in soil and the general limitations of microbean life to the upper layers of the soil, and the remarkable filtering influence of soil on the passage of bacteria through its interstices, one is forced to think this contingency is rare. If enteric dejecta do gain access to drinking water and wells from the soil, it is more probably by surface than by deep drainage.

Of course, outbreaks of this disease occur in places through various other circumstances, but they do not vitiate the value or importance of these conclusions regarding soil heat, soil dryness, and soil moisture.

The existing methods of disposing of excreta, though excellent in theory, are in many respects faulty in detail. As an example, I may give an instance, recorded by Surgeon Nichols,* of the Army Medical Staff, where the dry earth used for disinfecting the excreta was carried back in the same carts which brought the "soil," and was dug in in close proximity to the place where the filth was buried. Have we not here all the conditions necessary for the carriage of the disease?

* B.M.J., Vol. II., 1890, p. 1091.

Again, all who have resided in India must know of the liability there is to pollution of the wells from percolation of surface water. The habits of the natives are such as to defile the immediate neighbourhood of the wells, and, with a heavy rainfall, the surface impurities are rapidly carried into the water supply, without filtration through the layers of the soil. Is it any wonder, under such circumstances, that the disease is so widespread?

Enteric fever in India is the same disease as seen in Europe; both diseases are identical. The local and seasonal prevalence of the disease depend on soil heat and soil moisture, and these climatic conditions extend over wide areas and act upon localities always the same as regards a polluted soil. Certain local conditions exist in India which, aided by temperature and humidity, probably increase the virulence and assist in the diffusion of the poison.

Enteric Fever in Campaigns—Its Prevalence and Causation.

BY

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The great prevalence of enteric fever amongst armies in the field, the very serious drain that it makes on the effective strength of the troops, not only from the number of cases, but from their prolonged duration and subsequent slow convalescence, and the high mortality, are so well known to all military medical officers, that there is no need to quote, still less to dwell on, the statistics of this disease as an accompaniment of modern warfare. In the campaigns undertaken by British troops in South Africa, in Afghanistan, in Egypt, and on the Upper Nile, in the great war of the Rebellion in the United States, in the French operations in Tunis,—in all these campaigns, enteric fever has been one of the most serious, and, in some cases, by far the most serious and fatal, of all the diseases to which the troops have fallen victims. Only in Burmah do the British appear to have been free from its epidemic prevalence. In like manner, in Tonkin, the French army seems also to have escaped from any serious visitation. It appears, therefore, that in operations of war undertaken in tropical or subtropical climates, enteric fever has been of almost universal prevalence in recent years.

These outbreaks under the conditions of camp life show a marked similarity in their principal features.

In the Galeaka-Gaika war in South Africa, the troops crossed the river Kei in December, 1877, in the hot and dry season. Diarrhœa and simple continued fever soon became prevalent, but the general health was good. In the middle of January, 1878, heavy rains came on.

Several cases of enteric fever occurred towards the end of the month. In February sickness increased, consisting principally of diarrhœa, dysentery, and "common continued fever." Bowel complaints diminished towards the end of March, but as the cold weather came on enteric fever, at first mild and insidious, occurred throughout the country; and in May, it is reported, that "no place was free from it." It is stated by the Principal Medical Officer to have been "undoubtedly the most serious disease during the late war."

In the Zulu war, which commenced at the end of December, 1878, fever appeared at the headquarters at Helpmakaar, and at Rorke's Drift, in the middle of February, accompanied by diarrhœa and dysentery; the fever was thought to be "bilious remittent," or enteric, or a mixture of both. Helpmakaar became so unhealthy that the troops had to be moved to Utrecht and Dundee. Epidemics of enteric fever immediately broke out at both these places. At the beginning of May the rains ceased, and the sickness somewhat abated, but enteric fever continued at Utrecht. In June, the first division, operating in the low-lying swampy country near the coast, suffered exceedingly from fever, diarrhœa, and dysentery, while the second division on the healthy uplands suffered little.

In the Afghan campaign of 1878–1880, it is noted that cases occurred at almost all the stations occupied by European troops, stretching from the Indian frontier to Kabul and Kandahar. Some of these posts had probably never been occupied before, and many of these cases were quite isolated.

In the Egyptian expedition of 1882, there was great prevalence of bowel complaints, from the first landing of the troops in the latter part of July, diarrhœa, dysentery, and fever. Enteric fever occurred very soon, both at Alexandria and at Ismailia. When the troops arrived at Cairo, the disease increased gradually, but did not reach any great prevalence until October and November. During October, November, and December, out of a total of 319 deaths, no less than 223 were due to enteric fever.

In the Nile campaign, 1884–5, a great number of isolated posts were occupied, extending over a large tract of country. Enteric fever occurred at all, or nearly all, of these posts, most severely at Assuan and Wady Halfa.

In the American War of the Rebellion, notwithstanding the great prevalence of typhoid fever during the first year, the epidemic was never general: it consisted of a series of local or regimental outbreaks.

During the French operations in Tunis in 1881 the disease was extremely prevalent, about one-fifth of the whole force being attacked. It has been stated that all the columns on the march and nearly every occupied post were attacked more or less. In some instances bodies of troops suffered from the disease who had not been in contact with other (infected) troops, and who had not occupied any old (infected) encampment.

The two points which I wish to gather from the preceding summary, and to make prominent, and which were observable, the one or the other or both, in all the campaigns referred to, are—

1. *The appearance of outbreaks of the disease in isolated spots, many of which had not previously been occupied at all.*
2. *The prevalence of diarrhœa and bowel affections both previously to and at the same time as the outbreaks of enteric fever.*

I.

The theories as to the causation of enteric fever are, broadly, three in number, the *malarial*, miasmatic or climatic, the *pythogenic*, and the *specific*.

According to the *malarial* or climatic theory, the cause of the disease is a telluric poison or miasm, dependent on conditions of moisture and temperature not hitherto well-defined, and not connected in any way necessarily with decomposing fæcal matters nor propagated by drinking water; the cause is supposed to be not a particulate poison, but a telluric influence, or miasm.

According to the *pythogenic* theory this disease "may be generated "independently of a previous case by fermentation of fæcal and perhaps "other forms of organic matter."*

According to the *specific* theory the cause of the disease is a specific poison or *contagium*, and no case of disease can occur without the entrance into the affected body of this specific poison derived from a pre-existing case. Of late years the tendency of research has been to indicate, if not to demonstrate, that this specific cause is a *bacillus;* and Eberth, Gaffky, and other observers have isolated the *bacillus typhi abdominalis*, which is generally, though perhaps not universally, believed to be the specific cause of the disease.

The malarial or climatic theory need not further engage our attention; the question lies between the *possibility* of independent origin, according to the pythogenic theory, and the *necessity* of specific contagion from a pre-existing case, according to the specific, and *a fortiori*, the specific *bacillus*, theory.

The pythogenic doctrine was formulated and advocated by Murchison in 1858. At the time when he wrote, and for many years after, this was the prevailing theory. In the second edition of his work on Fevers (1873), he quotes the opinion of Hudson, of Dublin (1867), that "Upon no subject in practical medicine is there a larger or more "constantly increasing mass of evidence than as to the power of fæcal "miasm to generate typhoid fever, and to the fact that it does so."† The doctrine that specific contamination was necessary for the spread of the disease was taught by Budd in this country (1856) and von Gietl

* Murchison, *Continued Fevers.* 3rd edition, p. 499.

† Murchison, *op. cit.* 3rd edition, p. 498.

of Munich. Of late years this view has gained ground in England, at the expense of the pythogenic theory, so that now nearly all of our received text-books of medicine teach that this specific contagion is necessary. I may mention Bristowe, Fagge, Liebermeister in Ziemssen's *Cyclopædia*, Hutchinson in Pepper's *System of Medicine*, Strümpel, Broadbent in Quain's Dictionary, W. Cayley in the 3rd edition of Murchison's treatise. Dr. F. T. Roberts, on the other hand, considers that spontaneous origination is by no means improbable. Nevertheless there has always been a number of observers in India and elsewhere, amongst military medical officers, who have been unable to satisfy themselves that the disease can never originate *de novo* from pythogenic conditions.

In the Galeaka-Gaika war in South Africa, 1878, enteric fever broke out simultaneously in East London, King William's Town, and Fort Beaufort, gradually extending to other camps. Some medical officers thought contagion was conveyed from these towns to the camps; but the Principal Medical Officer, Dr. Woolfryes, reviewing all the circumstances, believed that the disease had an independent origin, due to the insanitary state of the ground in the vicinity of the camps, brought about by the filthy habits of the natives.

In the Zulu war, 1879, the condition of the camps was also very insanitary; they were overcrowded, the soil was often saturated with decomposing organic matters, giving off noxious emanations; the heat was intense. The Principal Medical Officer, Dr. Woolfryes, considered that two types of fever were present: a true remittent, and a typho-malarial, that is, enteric fever complicated by malaria; the latter might, he thought, have been induced solely by the drinking-water, which was constantly fouled with both animal and vegetable matters, from the filthy habits of the natives and from the fact that cattle frequently go into the rivers to die.

In Natal, in 1881, the water seemed also to be the cause of an outbreak. At Bennett's Drift, the supply of drinking-water was taken from a spring below the camp. The soil was porous, latrines near at hand, and contamination everywhere. At the camps at Ladysmith, and at Newcastle, fæcal defilement was of the most likely occurrence; importation by direct contagion was discovered, or considered probable, in some cases; but "fæcal pollution" was looked on as the most usual cause. "The climate, so far as the mechanical operation of the rain is "concerned, exerts a powerful influence in the production and propaga-"tion of enteric fever, by carrying sewage directly, or by soakage, into "the sources of water-supply."* At Kimberley, where cesspits and wells are in close proximity, with fissured stratification intervening, a heavy rainfall is invariably followed by enteric fever, and they are looked upon as cause and effect.†

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* A.M.D. Reports, 1881.—*Enteric Fever in Natal*, by Brigade Surgeon W. Skeen.

† *Ibid.*

In the Afghan war, it has been pointed out by Surgeon-General Marston that "as the troops occupied several positions that had pro- "bably been never before occupied by human beings, and as, in some "instances at any rate, it was extremely improbable that the water- "supply had been fouled, the campaign afforded an opportunity for "excluding the influence of an infected soil, or site, although not of an "infected corps."* As, however, enteric fever did break out at these isolated spots, and as importation, from the circumstances of their position, was improbable, the alternative explanation seems reasonable, that the disease was developed owing to insanitary conditions in the camps themselves.

In the Egyptian campaign, in 1882, it is impossible to exclude the causation by importation; but this explanation seems quite insufficient to account for the wide diffusion of the disease in the later months of the year after active operations had ceased. The Principal Medical Officer (Sir J. Hanbury) remarks:—"To ascribe the genesis of enteric "fever to any one specific cause, would not in this case, I think, be "justified by reason or experience. . . . One of the most potent "was exposure under canvas, on ground in the neighbourhood of a "large city, whose conservancy arrangements are on the most primitive "system, and the habits of the lower classes filthy, acting on a body of "men, lowered by the privations, hard work, and exposure of a cam- "paign during the hottest and most unhealthy season of the year."†

In the Nile campaign of 1884–5, the camping grounds were separated from each other by long distances. As a rule, medical officers reported favourably on the condition of their respective stations; some, however, reported otherwise, the most notable exception being that of Wady Halfa, where the ground was very foul. At Assuan also, the ground of a portion of the camp was very foul, and the troops there stationed suffered severely. There was hardly a station occupied from Assuan to Korti at which the disease did not prevail more or less, though many were most carefully chosen, and had not previously been used, either by Europeans or natives.

Coming now to the experience of the French in Tunis in 1881, it is stated‡ by M. Czernicki, that both in the first and in the second part of the expedition numerous bodies of troops were attacked, which had arrived from France free from infection, had never been in contact with infected battalions, and had never occupied stations that had been previously infected. He adduces two instances in particular, Ain-Drahan and Zaghouan, where encampments previously clean and healthy, and provided with good water, through overcrowding and insanitary conditions, became the seats of outbreaks of the disease. This writer's conclusions are disputed by M. Marvaud,§ who considers

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* A.M.D. Reports, 1879.—*Enteric Fever*, by Brigade-Surgeon Marston.

† A.M.D. Reports, 1881.

‡ *Archives de Med. et Pharm. Mil.*, 1883, ii. 401.

§ *Ibid*, 1884, iii. 273.

that specific contagion could not be eliminated, and that this was the cause of the prevalence of enteric fever. He admits, however, that the great majority of medical officers in the Tunis expedition believed in the doctrine of its autochthonous origin.

In the Oran operations in 1881–2, the disease broke out in the open desert, in stations never before occupied. It was, however, thought to be imported.

A careful and impartial consideration of the circumstances of prevalence in the cases just noted leads us to believe, I think, that *the probabilities are in favour of a pythogenic origin*, at any rate, in some of them, rather than to insist or assume that specific contagion occurred in every instance. Absolute proof in either direction, from the circumstances attending these outbreaks in the field, seems impossible of attainment. There are neither the means nor the leisure needed for making exact observations at the time. Subsequent investigation is difficult, and the *data*, whence conclusions might be drawn, often insufficient.

If the only alternative to origin by specific contagion were spontaneous generation in the sense formerly understood by this expression, that is, that a living entity can be produced out of something not living, that a plant or animal can come into being without a seed having been sown, or a germ fertilized, it would be an effectual argument against the pythogenic theory, that it is illogical and incredible, just as we believe that *ex nihilo nihil fit*. But I submit that the alternative does not lie between the two doctrines stated thus. Evolution is a factor that has to be taken into account, and I hope to show that a fair consideration afforded to this factor will render the pythogenic theory as reasonable and intelligible as it is easy of application.

II.

To bring this to bear upon the argument, I now proceed to the second point already referred to, namely, the prevalence of diarrhœa and bowel affections, both previously to, and at the same time as, the outbreaks of enteric fever.

This is noted in the account of the Galeaka-Gaika war, where diarrhœa appeared among the troops about the 20th January, very shortly after taking the field; enteric fever appeared at the end of the month. Diarrhœa and bowel complaints continued until the latter part of March, when they began to diminish; enteric fever continued to prevail much later.

In the Zulu campaign in the following year, fever, diarrhœa, and dysentery prevailed in the middle of February, a few weeks after the commencement of operations. Enteric fever very soon became prevalent, but it was not of well-marked character, and was not recognised as such at first. The general sickness abated in the beginning of May, but cases of enteric continued to occur.

The relation between diarrhœa and enteric fever in the Egyptian expedition of 1882 is thus adverted to by the principal medical officer (Sir J. Hanbury) in general terms, the accuracy of which will be admitted by all who had an opportunity of observing what occurred* :—
" Looseness of the bowels, under the name of camp diarrhœa, begins
" to be common almost as soon as an army takes the field. This is, in
" a large number of cases, compatible with apparently good health, and
" is doubtless attributable to the changed conditions of life. Soon
" cases of fever occur, some of very brief duration, which are classified
" as heat-fever, and some attended with diarrhœa, marking the
" commencement of enteric fever in the force. The development of
" this disease, and the proportions it will assume, will be merely a
" question of time and circumstances."

An outbreak occurred at the encampment of Pas de Lanciers, near Marseilles, described by Dr. Duchemin.† In 74 days there were 1,560 cases of fever or diarrhœa out of 8,500 troops. The 62nd regiment of infantry had three cases of typhoid fever immediately on its arrival in camp, on the 15th May. There was no outbreak of the disease until the 11th June, but in this interval there were more cases of *embarras gastrique* in this than in any other corps; the febriculas and gastric fevers preceded the typhoid invasion, and their number described an ascending curve, parallel to that of undoubted typhoid. After June 15 there commenced to be a constantly increasing number of sick, passing through all the phases of the typhoid process. From May 15 to July 24, there were 610 cases of real typhoid, and 950 cases of so-called " abortive " or " benignant " typhoid.

A somewhat similar outbreak of typhoid, preceded by cases of diarrhœa and *embarras gastrique*, occurred in the barracks at Condé in the department of the North, 1883–4.

It would be beside our present purpose to quote further instances of diarrhœa prevalence, precursory to outbreaks of undoubted enteric fever. I may just mention the case of Arundel‡ last year (1890), where there was an unusual amount of diarrhœa in August and September, and a well-defined outbreak of enteric in November, traced to drinking water fouled by fæcal contamination. Murchison also states§ that " The ordinary autumnal increase, or circumscribed
" epidemics, of enteric fever, are usually preceded by a great prevalence
" of diarrhœa, the diarrhœa reaching its acme long before the fever
" does, and having greatly declined by the time that the latter is most
" prevalent."

Now in the above-quoted instances, either there was a connexion between the preliminary diarrhœa prevalence and the subsequent enteric fever prevalence, or there was not. If we believe in the origin

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* A.M.D. Reports, 1889; Egypt.

† *Archives de Med. et Pharm. Mil.*, 1886, vii.

‡ Report by Dr. Charles Kelly, *Public Health*, June 1891.

§ *On Fevers*, 3rd edition, p. 497.

of enteric purely and simply by specific contagion from a pre-existing case, then no amount of diarrhœa prevalence is of any consequence one way or another. But there are difficulties in the way of such a belief; in some cases, as has been said, "It would not be justified by reason or experience." Neither, I think, are we justified in declaring that the diarrhœa prevalence has nothing to do with the enteric outbreak. Let us assume for a moment, that there is, or may be, some causal connexion between the two, and try to figure to ourselves how such connexion could be brought about.

In the *first* place, the *actual records* seem to show that this connexion did exist in the instances quoted: a gradual development of definite enteric fever seems to have been observed from ordinary diarrhœa, the intervening degrees of feverishness, *malaise*, *embarras gastrique*, anomalous and ill-defined fever with diarrhœa, apparently being separated from each other by no distinct demarcations. Such a connexion of course might be only apparent, not real; some connexion is at any rate obvious.

Secondly, in what way, if at all, may it be reasonably supposed that an enteric fever outbreak can originate from a prevalence of diarrhœa? It is well known that "camp diarrhœa" is of the commonest occurrence amongst troops shortly after taking the field, in a tropical or sub-tropical climate. Change of habits, change of food, improper or unsuitable food, bad water, heat and exposure to sun, and chill—these are all obvious factors in its causation; there is nothing in any way specific. Let us consider the sequel as regards the individual, and as regards his surroundings. The individual may in some cases remain in fairly good health and vigour, in spite of a continuance of bowel trouble; other individuals may suffer more, from the exposure, fatigue, and weakening effects of the continued flux. The surroundings may possibly be, and remain sanitary, the camp clean, the water pure; but in all probability the reverse will be the case, at any rate, in some instances: the water bad, the soil fouled, very likely overcrowding of the camp, with consequent difficulty, if not impossibility, of proper removal or disposal of fæcal matters. Under certain conditions of heat and moisture, favourable to the development and multiplication of low forms of vegetable and animal life, which is the more likely, or reasonable to expect? That diarrhœa in weakly and exhausted individuals should remain diarrhœa, and nothing more; or that with an increase of filth and decomposition, polluting soil, air and water, a development of filth-generated, pythogenic poison, should take place, capable of causing in such weakly persons a fever, with diarrhœa, a poisoning of the organism, producing pyrexia and inflammation of certain glands in the alimentary tract, in fact, a specific fever? Is this supposition of the evolution, gradual or rapid according to circumstances, of a disease-poison, dependent on *increasing* conditions of pollution of soil, air, or water, either separately, or all three together, unreasonable or illogical? Would it not, on the contrary, be more unreasonable to suppose that, under such conditions, there could be no evolution at all? These

conditions of camp-pollution undoubtedly exist, and tend to increase, in many instances; are they to have no effect? Is diarrhœa to continue as simply diarrhœa, or is evolution to come into action, and produce a new disease? New indeed, only because the causes necessary for its production are but just now brought into operation,—spontaneous only in the sense that water is of spontaneous origin, when from hydrogen and oxygen the electric spark has produced water, where no water was before.

Thirdly, is any support for this view to be derived from *analogy in other diseases?* In at any rate two other diseases, dysentery and diphtheria, a very considerable analogy can, I think, be traced. "The "independent production of the dysenteric poison by the putrefaction "of animal substances under certain conditions has been maintained "for centuries," and is doubted by no one. And yet the evidence of the contagious nature of the "dysenteric stool" appeared to Murchison quite as strong as that of the typhoid stool.* Maclean also affirms the fact of the propagation of dysentery, through the practice of preserving the stools in the wards for examination.† As Parkes says, "this seems "to show the origin of a communicable poison *de novo*." I should prefer to express it as, "the production of a communicable poison, by "evolution under favouring conditions." It will probably be admitted by all observers at the present time, that the dysentery which arises at an early period of camp life in any army in the field will become contagious and assume an epidemic form, unless special disinfectant and precautionary measures are taken to prevent such an occurrence. Surely there is an analogy between this process and the assumed evolution of enteric fever now under consideration?

Similarly, in accounts of outbreaks of diphtheria, it is a matter of the commonest occurrence to see noted the prevalence of "sore throat," without apparently any special diphtheritic character, for some time previous to the actual outbreak. This appears to point to the gradual evolution of the specific poison.

Lastly, the growth or evolution of the typhoid poison is indicated in the fact, known to practitioners in the Western and Southern States of America, that "typhoid fevers are becoming more and "more frequent in places and settlements, and under circumstances, "where hitherto the ordinary autumnal remittents and intermittents "have prevailed extensively." Typhoid fever seems disposed to, as it were, displace endemic bilious fever, as the improvement of the agricultural districts advances.‡

From the fact of diarrhœa-prevalence precursory to enteric fever outbreaks, which, as I have shown, is recorded to have taken place in many instances, and from the arguments as to probability, and analogy

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* Murchison, *op. cit.*, p. 484.

† Reynolds' System of Medicine, Vol. I.

‡ See *Medical History of the War of the Rebellion*, Part III., Vol. I., by Charles Smart, Major and Surgeon, 1888, p. 501.

in other diseases, I submit that a theory of *the pythogenic origin of enteric fever, by evolution of the disease-poison under favouring conditions*, is as reasonable and intelligible as it is easy of application.

III.

So far, the evolution of the disease-poison has been alluded to in general terms, without attempting to particularise or define what the actual *contagium* is, or in what it consists. The tendency of modern research is to the belief that there is a specific parasite for each specific contagious disease; and in the case of enteric fever the *bacillus typhi abdominalis* of Eberth and Gaffky, though not actually demonstrated, is generally believed to be the cause.

Assuming that this organism is the specific *contagium*, is it necessary to believe that each bacillus, or group of bacilli, that give rise to a case of enteric fever, should originate immediately from a pre-existing bacillus or germ of the *same* species, and derived from a pre-existing case of the same disease? or is it conceivable to suppose that the bacillus should have developed its specific disease-producing properties from other varieties, or from some one other variety, of bacillus, by a process of evolution, under favouring conditions? That the latter proposition is not only conceivable and logical, but also by no means improbable, I hope to be able to show.

There is considerable ground for believing that the *bacillus typhi abdominalis* of Eberth is causally connected with typhoid fever; but there is also no doubt that this is not the only bacillus connected with the disease. The question of the relationship of the various bacilli met with in the intestinal contents and viscera of typhoid patients is of great importance, but in the present state of knowledge is in a very unsettled condition. With regard to the *bacillus coli communis*, which is met with in the ordinary contents of a healthy intestine, Messieurs Rodet and Roux believe that it is in reality another form of Eberth's bacillus; they have found the *bacillus coli* in the fæces, and Eberth's bacillus in the splenic blood of the same typhoid patient. Though there are differences in the morphological characters, and in the characters of the cultivations of the two forms, these observers do not consider them to be sufficient to differentiate two distinct species. They look upon the bacillus of Eberth as *bacillus coli* in a state of attenuation or degradation, and "considering "on the one hand the tolerance which the organism has for the *bacillus* "*coli*, as it commonly presents itself in the intestine, and on the other "hand the injurious nature of water contaminated by it, they are led "to the conclusion that, in the great majority of cases, it acquires "outside the organism its 'typhigenic' character."* This opinion appears to be much the same as a belief in the evolution of the specific

* *Comptes Rendus de la Soc. de Biologie*, XI., 1890. Splenic blood yielded nearly a pure culture of Eberth's bacillus; fæces contained no Eberth's bacilli, but *bacillus coli* in enormous numbers almost as a pure cultivation. Eberth's bacillus appears to be the result of a modification of *B. coli* in passing through the organism.

character, under specially favouring conditions, by an organism which under ordinary circumstances has no such morbific properties.

Professor von Babes has quite recently shown that numerous *atypical* typhoid bacilli exist in the bodies of typhoid patients, resembling Eberth's bacillus very closely, and yet differing therefrom in some one or more cultivation characteristics, and in pathogenic properties. Von Babes considers that it is not only the *bacillus coli communis* that exists along with Eberth's bacillus, but that there are many forms, furnishing a series of gradations between the typical typhoid bacillus and the common saprogenic bacilli.*

Dr. Cassedebat† has also described various pseudo-typhoid bacilli closely resembling, and yet showing some differences from, the typical bacillus of Eberth. These differences are apparently very slight, and it is a matter requiring further observation and confirmation, how far they are constant and permanent.

Prof. Victor Vaughan‡ isolated two bacilli from water, suspected of contamination with typhoid excreta, which, though presenting cultivation-characters differing from those of Eberth's bacillus, produced in animals lesionsthat were identical, and were more fatal in their effects.

This is not the place to enter into a discussion of the bacteriology, of enteric fever. It is seen, from the brief statement I have just made, that there are skilled observers of the first rank who do not consider that there is one, and only one, micro-organism connected with the causation of the disease; but on the contrary, that either the *bacillus coli communis* (until lately regarded as devoid of pathogenic properties), or, as is more probable, a considerable number of closely related organisms, play some part in its production. That these forms are not all distinct permanent species, but varieties, or races, or transition forms, is certainly by no means an unreasonable supposition.§

IV.

The general conclusions which I venture to draw from what has been said may be expressed as follows :—

First, that although the doctrine at present generally held in this country, on the Continent, and in America, as stated in some of the most widely read and deservedly respected text-books, is to the effect that a specific *contagium* derived from a pre-existing case is necessary for the production of a case of enteric fever; there is, nevertheless, a widespread

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* *Zeitschrift für Hygiene*, 1890.

† *Annales de l'Institut Pasteur*, Oct. 1890.

‡ *Philadelphia Medical News*, 1890; and *Centralblatt für Bacteriologie*, June 1891, ix., 832. *See also* Paper by Theobald Smith, *New York Med. Journal*, Nov. 1890; and *Centralblatt f. Bact.*, 1891, ix., 606.

§ Surgeon-Major D. D. Cunningham has this year made somewhat similar observations on the comma-bacilli found in cholera.—See *Scientific Memoirs of Med. Off. of Indian Army*, VI., 1891.

belief amongst military medical officers, English, French, and American, that the disease may originate spontaneously; and that this belief rests on a wide induction from a very large number of facts, which are very difficult, if not impossible, of explanation on any other theory.

Secondly, that although the general belief among bacteriologists is that enteric fever is produced by the specific organism known as *bacillus typhi abdominalis*, and by this specific bacillus only; nevertheless, within the last year or so, some competent observers have arrived at the conclusion that this bacillus is not the only one concerned in originating the disease, but that other bacilli, closely connected with, and in some instances hard to distinguish from, ordinary saprophytic bacilli, have some causal connexion, though its exact nature is at present quite undetermined.

Thirdly, that the theory of pythogenic origin, or spontaneous origin *de novo*, comes into line and agrees with the bacterial theory of disease-production, if the idea of necessity for contagion by one single specific bacillus be abandoned, and the possibility of evolution of disease-producing properties, through successive generations of bacilli, be entertained. It is suggested that the diarrhœa-prevalence so frequently associated with enteric outbreaks is dependent upon, and an expression of, this process of bacterial evolution.

Liebermeister has declared that specific infection is necessary. "No matter how well a field is manured," he says, "wheat will not "grow unless wheat has been sown." More lately, Strümpel (1887) declared the same, and affirmed that there was not the slightest proof that typhoid bacilli can be developed from any other micro-organisms. I would not venture to say that even now there is any *proof* that such is the case; but I venture to say that it is a reasonable supposition, taking into consideration the results of recent researches in bacteriology, and that it will afford a simple and satisfactory explanation of those outbreaks in camp life that have hitherto been so difficult to account for.

It is obvious that if this supposition be correct, a ready explanation is also afforded for the great variety of types of enteric fever that are met with; they may be considered as dependent upon the degree of evolution that the bacillus has reached. And that this is not fanciful, or illogical, must, I think, be allowed, when we bear in mind the extreme rapidity of propagation, and enormous number of generations of bacilli, that are produced in a very short time. No believer in evolution would deny that changes in form and function might take place in, say, 100 or 1,000 generations of a living organism, providing the environment is altered favourably, or the reverse, in one direction or another. But bacteria will pass through 100 or 1,000 generations in a few days; what difficulty, then, is there in supposing that the thousandth generation should have characters and properties different from the first, different as regards action on human beings, as well as in regard to cultivation media. The circumstances of the environment are all-important, and the co-existence of filth, organic matter undergoing decomposition, or fæces, with the most favourable conditions of temperature and moisture,

may reasonably be supposed to bring about such a change in the nature of a micro-organism as to endue it with disease-producing properties, and so cause the production of a specific poison *de novo*. In this way, though wheat, as Liebermeister says, will not grow unless wheat has been sown, a bacillus capable of producing enteric fever may come into being, even though no *bacillus typhi abdominalis* were numbered among its ancestors.

I have not touched upon the mode of spread of the disease in the field, by water, emanations from polluted soil, and the like, as my object has been only to bring together, on the one hand, the facts observed by military medical officers in the field, and, on the other, some of the latest results of bacterial investigation, in the belief that the latter furnish a true explanation for the admitted difficulties in the former, and that a theory of origin, at the same time pythogenic and bacterial, yet not specific, except by evolution of specificity, will be found to meet the facts of the case.

Camp Fevers; their Origin and Spread.

BY

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with the Suakin Field Force, 1885.

In all campaigns the loss from sickness greatly exceeds that from wounds, whether the war is in temperate or tropical climates. In the Crimea, more deaths occurred from diseases of the bowels alone in one month (January, 1855) than from wounds during the whole campaign.* Fortunately, we do not now have to record the enormous mortality from fevers which decimated armies even up to the beginning of the present century. Sickness amongst troops has been diminished by improved hygiene, aided by an appreciation of the fact that medical science can assist generals in the field to win battles by keeping the men fit to fight;—though we must not leave out of consideration the tendency to shorten campaigns, due to the more deadly weapons of the present day. The more prolonged the campaign, the greater becomes the proportionate sickness in the force. But fevers of various kinds still furnish a large death-roll, even in our "little wars." This is, no doubt, partly due to the unhealthy climates in which our troops are often engaged. But the military exigencies of a campaign, necessitating fatigue and exposure, perhaps with scanty food of inferior quality, render the troops liable to other diseases than those which these causes will of themselves produce; and medical officers, whilst doing all that is possible, by their advice, to prevent undue fatigue and exposure, are obliged to make hygienic requirements subservient to military necessities. In camps

* Report on the pathology of the diseases in the East, by Dr. Lyons, 1856.

where the troops are stationary, the medical service has more scope for hygienic and sanitary precautions, and here the *prevention* of disease should be one of the main objects.

The first step towards prevention is to get a thorough understanding of the nature of the diseases with which we have to deal, and especially to study their originating causes, and the means by which they spread. It is not enough to rest content with the experience of the past, and to conclude that whenever men are massed together in camps, certain diseases will assuredly occur. If this had been the rule, we should still have typhus and the plague in all our camps. Rather should we consider each fresh campaign as a further opportunity for observation and research into the medical history of armies in the field. There is still much wanting in the differentiation of camp fevers, and in the measures required for their prevention.

The fevers that occur in camps are not all simple types, and thus the difficulties of differentiating and classifying them is increased. Well-known fevers may be considerably modified by the conditions—telluric as well as sanitary—under which they occur. These conditions may be responsible for the almost universal occurrence of a particular symptom, *e.g.*, diarrhœa, which gives some similarity to widely different diseases, and may result in their being erroneously classed under one heading.

Apart, too, from such difficulties in the exact diagnosis of known and usually well recognised diseases, it is more than probable that camp fevers include some morbid conditions which as yet are not fully understood and not clearly distinguished. The recognition and description of these conditions can only be brought about by careful pathological investigation supplementing clinical observations; and *post mortem* examinations should not be neglected, even in the field. May we hope in future campaigns to see a pathologist added to the staff of the base hospital, in addition to the registrar, whose time is too fully occupied for him to make autopsies? The results to be thus gained would be most valuable.

Believing that our knowledge of camp fevers is far from complete, it is obviously impossible to attempt an exhaustive classification of such fevers. I propose, rather, while indicating briefly the chief types which may occur, to confine myself to personal observation of two distinct types of fever which are often undistinguished.

The fevers which may assume importance in camp are as follows:—

I.—*Acute specific Fevers:*—

- α. Exanthemata—Small pox: Measles: Typhus.
- β. Enteric Fever.
- γ. Cholera.
- δ. Dysentery.

II.—*Non-specific Fevers:*—

- α. Acute Gastro-enteritis (non-specific typhoid, or "filth fever").

i p. 2258.

β. Camp diarrhœa.

γ. Simple Continued Fever (Febricula).

III.—*Malaria* and its allies.

IV.—*Diseases of the Respiratory Organs* :—
Pneumonia and Bronchitis.

V.—*Acute Rheumatism.*

VI.—*Mixed Types, i.e.*, associated and modified diseases.

I.—*Acute Specific Fevers.*

The Exanthemata.—The fevers of this class which have a long incubation stage are most likely to occur, unless the troops are camped in districts where scarlet fever, &c. are prevalent. The fevers with a long incubation may appear early in the history of a camp, being started by men who took the infection before leaving their last quarters. Isolation of the sick is the only safeguard.

If the campaign is in a country where small-pox is prevalent, or against an enemy or with allies amongst whom small-pox is common, a supply of vaccine lymph should be sent out with the force.

Measles caused much sickness in the American War, where fresh levies were constantly coming straight from their homes to the front.

Typhus is almost banished from English camps, where attention is paid to the proper spacing of tents or huts, and to the segregation of the different components of the force. But it is by no means to be left out of calculation in the event of a large force taking the field for a prolonged campaign.

Enteric Fever is, *par excellence*, the camp fever of modern British wars. Opinion as to its origin and spread is by no means undivided, even in this country, though probably the weight of the medical opinion would be in favour of its specific nature. But the impossibility of tracing the source of infection in every case furnishes an argument for those who believe in its possible origin *de novo;* and these difficulties being often greater when dealing with an outbreak in the field, may account for the belief, shared by many able and experienced army medical officers, in the non-specific nature of enteric fever. I would suggest also that the difficulties in the way of exact diagnosis under the conditions of a campaign may have some influence in fostering this belief. At Suakin in 1885, where I had charge of a division of about 90 beds in the hospital at H Redoubt, I noticed amongst the patients who were diagnosed as suffering from enteric fever certain peculiarities in symptoms which were unlike what I had met with in enteric fever at home. I accordingly made autopsies on those patients who died, and although these were from necessity hastily made, they furnished interesting results. The presence of the pathological intestinal lesions of enteric fever were demonstrated in some of the cases, but in others these characteristic lesions were absent, even after an illness of three weeks duration. Clearly, then, there were two distinct diseases present, though the symptoms observed during life were similar in both. A most instructive account of a similar co-existence of two diseases,

alike in their symptoms, but differing pathologically, is to be found in the appendix of the Army Medical Report for 1879, where again *post mortem* examination alone revealed the existence of two distinct morbid conditions. In this case, two British regiments in India moved to the same neighbourhood from different points. Soon after arrival, cases of illness occurred in the two camps, the symptoms being similar in both. In the one regiment, which had come from a station where enteric fever was prevalent, a fatal case was found to exhibit the intestinal lesions of enteric fever, whilst a fatal case in the other regiment showed no such characteristic enteric lesions. These observations furnish a strong ground for more extended pathological investigation. I have experienced the difficulties of making *post mortem* examinations, even in a stationary camp, during a campaign, but a record of the condition of the alimentary tract in all cases of death, with short notes on a temperature chart of all cases in hospital, would give valuable information.

The enteric fever poison is most usually conveyed by means of water or drainage, but we must remember the possibility of its spread by the air near the source of infection. At Suakin, enteric fever—probably imported from Egypt*—spread, though the supply of condensed water to the whole force precluded the possibility of contamination of the drinking water. The orderlies in charge of fever ward-tents furnished a large proportion of cases after the first month, but the majority of the patients most likely caught the infection from the latrines. It is probably not enough to throw earth into a latrine once a day; and as it is impossible to get the men themselves to do so, it seems advisable to have followers detailed to throw in an inch or two of earth or sand, and perhaps some disinfectant, more frequently. The great difficulty in prevention consists in the fact that it is almost impossible to get men to report themselves sick until they have been several days ill. I have known—as probably most medical officers have done—a man die with perforation of the intestine within four days of reporting sick. He must have been disseminating the enteric fever poison for a fortnight before he came into hospital. Where almost every man in the force has diarrhœa, it is impossible to suggest that men should report all looseness of the bowels.

Cholera.—The instructions in relation to cholera contained in the Army Medical Regulations are sufficiently complete to make it unnecessary to do more than refer to them here. The unexpected occurrence of cholera in the Crimea shows that provision for this disease cannot be omitted from the medical arrangements of a campaign.

Dysentery.—That the issue of condensed water will not in itself prevent dysentery was evident in the Suakin campaign. Local conditions similar to those which will produce malarial fevers are probably important factors in the causation of this disease.

* *Vide* paper on Enteric fever at Suakin. Trans. Med. Chir. Soc., Vol. LXIX., 1886.

II.—*Non-Specific Fevers.*

This second group in our classification brings us onto uncertain ground. The pathological conditions observed in some of the autopsies which I made at Suakin might justify the term "gastro-enteritis" being applied to these cases. In the Crimean War, this term was used to designate a large class of cases, characterised during life by diarrhœa and vomiting, and showing after death vascular engorgement of the mucous coats of the alimentary tract, and even ulceration. But the term, after all, only denotes a marked feature of the illness, and suggests no idea of its origin. Gastro-enteritis may result from improper food, or it may be a concomitant of a general disease, as in some malarial fevers. The conditions which will give rise to enteritis require more careful investigation. It seems possible, that cases of this kind may be sometimes referred to fæcal contamination of air or water, and may furnish some of the cases classed as non-specific enteric fever. They might be termed "filth fever." When true enteric fever is prevalent, such cases may escape special notice, and be returned as "enteric fever."

Camp diarrhœa may be partly due to exposure and chill, but its almost universal prevalence in many instances suggests the possibility of some specific morbid poison not yet isolated.

Malaria and its Allies.—In marshy districts the dangers from malarial poisoning are well recognised, and prophylactic measures, including the use of quinine, are employed. But recurring attacks of fever occur in districts not suspected of being malarious, as on the sand-covered coral of Suakin, on which the night dew was heavy. The conditions which give rise to such fevers may produce a modifying influence on the course and symptoms of such diseases as enteric fever, prolonging the incubation period, producing marked remissions in the temperature chart, and delaying convalescence. Whatever may be our opinion on the advisability of employing the term "typho malarial fever," it is certain that symptoms closely simulating those characterizing enteric fever may occur in fevers due to some climatic or telluric conditions, especially if enteric fever is prevalent at the same time. For my own views on the subject of typho-malarial fever, I must refer to an article in the "International Medical Journal" for April 1887.

The term *Simple Continued Fever* should be most cautiously used, if it is to be retained at all in our nomenclature. There is a danger of its being employed as a cover for incomplete diagnosis; for the short febrile illness of indeterminate origin the term "febricula" would seem to be more appropriate.

Diseases of the respiratory organs, such as pneumonia and bronchitis, may occur as primary causes of sickness where exposure is great or the climate inclement. They are also common complications of other acute diseases.

Rheumatism also is a frequent complication of the disease known as Gibraltar fever, and by other names.

Mixed Types.—By this term I do not wish to imply a belief in hybrid diseases; but two diseases may run their course simultaneously

in the same individual, and a disease may be modified in its course by a co-existing constitutional taint. Thus, for example, diarrhœa may accompany pneumonia, and enteric fever may be modified by a malarial cachexia. In such cases it may be difficult to decide in which category the illness should be classified.

The fact that the proportion of sickness amongst officers in the field is less than that amongst the men, cannot be entirely due to superior physique and better resisting power in the former; it suggests that there are conditions in the surroundings of the latter, the removal of which might diminish sickness. But the large amount of illness amongst officers and men alike, shows the influence of conditions common to all. Many of these may be beyond the control of medical science and sanitation, but how many are remediable we cannot tell without knowing the causes of the sickness that occurs. This necessitates a knowledge of the different fevers, at present deficient. Before Scriven, by *post mortem* examinations, demonstrated the existence of enteric fever in India, the disease passed under the observation of medical men in that country unrecognised. During the prevalence of enteric fever in camps, other fevers may pass unrecognized—as I found at Suakin—if we rely upon clinical observation; until by comparison of symptoms, carefully recorded during life, with the pathological conditions revealed after death, it becomes possible to differentiate more clearly the different diseases. The treatment of these fevers may be more successful if they can be more exactly recognized; and prophylactic measures are only possible when we know what is to be prevented. In the whole range of military hygiene as applied to armies in the field, there is no more important consideration than the means for the prevention of camp fevers. I have, in this paper, indicated some points for future investigation; I cannot pretend to elucidate all the intricate details of so difficult a subject.

If I should succeed in stimulating research directed to a more exact knowledge of the origin and course of the various fevers which attack armies, and so prepare the way for successful attempts to further diminish the sickness incident to campaigning, this paper will have fulfilled its object.

Prophylaxie de la Fièvre Typhoïde dans l'Armée Française.

PAR

M. le Docteur Schneider, Médecin Major de 1ère Classe, attaché à la Direction du Service de Santé au Ministère de la Guerre.

J'ai déjà eu l'honneur au Congrès d'hygiène de Paris en 1889, et au Congrès international de médecine et de chirurgie de Berlin en 1890, de montrer ce qu'avait fait le Ministre de la Guerre M. de Freycinet pour la prophylaxie des maladies infectieuses, et plus particulièrement pour celle de la fièvre typhoïde dans l'armée française.

Je viens aujourd'hui vous faire connaître que les progrès réalisés les années précédentes ont encore été dépassés pendant le 1er Semestre de l'année actuelle, et que la diminution de la *morbidité* et de la *mortalité* typhoïdes a non seulement été continue mais aussi progressive.

C'est ainsi que la statistique médicale de l'armée nous montre que la fièvre typhoïde a atteint :—5,991 hommes de l'armée française à l'intérieur en 1887, 4,883 en 1888, 4,274 en 1889 ; que la mortalité typhoïde a été de 964 en 1886, de 763 en 1887, de 801 en 1888, et de 701 en 1889.

La statistique médicale de l'armée n'est pas encore publiée pour l'année 1890, mais les compte-rendus mensuels qui sont arrivés à la connaissance de la Direction du Service de Santé, et qui ne sont inférieurs à la réalité que pour quelques unités représentées par les hommes atteints étant en permission dans leurs foyers donnent une morbidité de 3,491 et une mortalité de 572.

Or, les six premiers mois de l'année 1891, comparés au même espace de temps en 1890, accusent un nouveau progrès considérable.

C'est ainsi que tandis que les compte-rendus mensuels du 1er Semestre 1890 annoncent 972 cas et 252 décès, ceux du 1er Semestre 1891 ne donnent que 788 cas et 191 décès.

Cette diminution de 184 cas et de 61 décès dans le 1er Semestre fait donc espérer que l'on obtiendra sur la totalité de l'année 1891 par rapport à 1890, une diminution au moins égale à celle qui avait été atteinte en 1890 sur 1889.

La continuité et la progression naturelle de cette diminution montre combien a été rationnelle et profitable la voie suivie par le Ministre de la Guerre, et le Service de Santé militaire français dans la prophylaxie de la fièvre typhoïde. On sait en effet que c'est par l'amélioration progressive de l'eau de boisson et des latrines dans les divers casernements qu'on a cru devoir combattre le fléau.

Pour les latrines on tend à remplacer partout les fosses fixes par le tout à l'égout ou les tinettes mobiles.

Quant à l'eau d'alimentation, partout où il n'est pas possible de faire venir de l'eau de source irreprochable, on installe des filtres Chamberland.

C'est en effet presque toujours dans l'adultération des eaux de boisson par les matières fécales que l'on retrouve la cause des épidémies militaires de fièvre typhoïde : les analyses faites au laboratoire bactériologique crée à l'École d'application du Val de Grâce l'ont péremptoirement démontré.

J'ai autrefois rappelé les épidémies de Beauvais, de Verdun, de Lunéville, de Mézières, de Cherbourg, de Lorient, de Dinan, de Nice, d'Angoulême, de Mirande, d'Agen, de Paris ; je citerai aujourd'hui les épidémies plus récentes de Courbevoie, d'Avesnes, de Versailles, de Lisieux, de Montargis, d'Auxonne, dans lesquelles le laboratoire du Val de Grâce a décelé soit le Bacille d'Eberthy soit le Bactérium Coli commune, soit une abondance excessive des microbes de la putréfaction.

Par contre, l'immunité conférée par l'installation des filtres et par l'adduction de l'eau de source aux nombreuses garnisons autrefois si

éprouvées s'est maintenue pendant les deux dernières années; on a donc tout à espérer de la généralisation des mesures prophylactiques ordonnées par M. de Freycinet.

Sans doute on a encore de douloureuses surprises, quand une canalisation qui présentait toute sécurité vient à être envahie subitement par des infiltrations fécales, mais malgré quelques épidémies accidentelles on peut assurer que dès à présent les cas de fièvre typhöide ne se présentent plus qu'à l'état sporadique dans les garnisons où elle faisait naguère sous la forme épidémique les plus cruels ravages.

DISCUSSION.

Brigade-Surgeon Staples, M.S., after complimenting the readers of the papers, alluded to the question of the prevalence of enteric fever in India. He passed over the question of the immediate causation of the disease, whether from microbes, from their biological development, or from their chemical products, and went on to the practical questions regarding it which are tangible and within our reach. He said there were four main factors underlying the great problem, namely:—(1) The undue susceptibility of the newly arrived in the country; (2) the still greater susceptibility of those who newly arrived at an unsuitable season of the year; (3) the undue susceptibility of individuals within the septennial period from 18 to 25 years of age; (4) adverse surroundings.

He then asked the meeting to allow him to put aside the two latter points, for the purpose of enabling him the more to emphasise the two former ones, viz., the cases of the newly arrived and of those who arrive at an unsuitable season. He then traced the fatality from fever in Bengal from 1860, the first year for which statistics are available, to the present time, and, examining these figures by the factors, showed in a variety of ways, how they influence the millesimal ratio of mortality. Beginning at the later years of the Mutiny, he mentioned how the then great increase in the mortality followed the influx of Europeans into India, by which the strength of the army was increased from 20,000 to 55,000 men, who, owing to the exigencies of the Government, were poured into the country, occasionally at least, at unsuitable seasons of the year. He then showed that until 1869 there was a decrease in the fever mortality, and explained it by showing that during these years the Bengal European army recruited itself by volunteering, that practically there were no new arrivals in the country, and, moreover, during these years the troops reached the country by the old way round the Cape, and in November, when they had a long cold season before them. He then mentioned the great change which had taken place in the years 1869, 1870, and 1871, when the fever mortality rose enormously. He said this was due to the facts of the great exodus that took place from the European army by the men who enlisted in 1857 and 1858 leaving under the then introduced new system of what was called limited engagement, by the return home of the regiments that went out in the Mutiny, who were climatically seasoned troops, and their relief by newly arrived and generally younger men, and many of the latter too, owing to the then newly introduced system of sending troops to India by troopships, arriving late in the season, or, in other words, at an unsuitable season of the year. He then

showed from an examination of the records, that for some years there was a stationary but high fever-mortality, and that with reference to this the conditions of the troops as regards the main factors were the same; in other words, the proportion of newly arrived and the season at which they arrived were much the same, until 1879-80-81—the years of the Afghan war—when there was a great increase in the adverse conditions of the troops, and with it an increase of fever. He next mentioned the fact of the increase of the army in 1886 by 9,000 men, and the corresponding increase of the fever-mortality, the explanation being that they were newly arrived either from home or the colonies, He next passed to the question of drafts arriving in India in the early cold season, in the first troopships, and those arriving at the beginning of the hot season, and from his own experience, stated that the latter furnished the enormously greater mortality.

He then drew the practical conclusion, viz., that as regards the Bengal European army, it is necessary to resort to the old system of landing troops in that country, and thus giving them the benefit of the cold weather before the dry season begins. He then incidentally and in conclusion condemned the Indian system of trench conservancy, stating that where you had to rely on well-water, it must follow inevitably that pollution will occur.

Surgeon-General Jeffery Marston said that as he had only a few minutes to speak, he desired to make his remarks, like the last speaker, as practical as possible, considering, too, that this was a Hygienic Congress. He dwelt especially upon the circumstances under which this fever occurs in campaigns and in India, and upon the importance of selecting the right season for sending out our troops to hot climates, and, in case of war, he thought more might sometimes be done in the selection of regiments. Whether the disease were attributable to the bacillus of Eberth and Gaffky or not, or to any other micro-organism, it would not do to stop there. We wanted to know what could be done to protect our troops abroad and in the field against this fever; and what practical suggestions could be made in this respect. Everybody recognised the importance of the subject, the necessity of obtaining a good and wholesome environment, and of the application of sanitary measures. What we now wanted was something to indicate that the discovery of "a particulate" as a cause gave us more precision in the application of our hygienic regulations. He should like to hear what medical officers who had recently returned from India had to say about the conservancy, water-supply, and local conditions of military stations there at the present time.

Brigade-Surgeon Harvey said that the man who has seen most of Indian fevers should be the last to dogmatise about them. He believed that the last word was far from having been spoken, and that much remained to be done before we could be sure that our information was complete. He had seen many typical cases of enteric fever and many of remittent fever, many also of a fever which in former years used to be returned as remittent, but which was now entered as enteric. This raised the apparent numbers of that disease. In these cases the temperature charts did not correspond with the typical charts as given by Wunderlich and others.

For some time it had been present in his mind that there might be another variety of fever intermediate between enteric and remittent, yet

differing from the one in important particulars, especially the range of temperature and the pathological appearances, and from the other in not being influenced by quinine.

In our latest little war on the Miranzai frontier, in which he had the honour to be principal medical officer, 14 cases of remittent fever were returned among the native troops and followers, and one among the British troops, while six cases among the latter were returned as enteric.

The diagnosis was made by a most careful and competent man, and the cases corresponded to hundreds of others annually returned as enteric fever. If we accepted Surgeon Davies' theory of possible origin, there was no difficulty in accounting for them; but if we consider the disease to have a specific origin, then as the men had left India longer than the longest incubation period, and the native population knew nothing of a fever lasting three weeks and ending in death, it was very difficult to account for them.

None of the men died, but the temperature charts did not correspond with the enteric type, and were very similar to those of the remittent fever cases among the native troops. The conditions under which the troops were serving were such as are supposed to be favourable to the genesis of remittent fever. High steep mountains separated by narrow valleys, a hot sun by day, cold nights, heavy dews, and occasional heavy storms, drenching men bivouacking without tents. He had no doubt that a few years ago all these cases would have been returned as remittent fever, and by many medical officers even now. He thought that, pending further investigation, the term typho-malarial as recognised by the American nosology might be used provisionally and as a matter of convenience.

It was clear that cases such as had been quoted by Dr. Squire could not be examples of the same disease, and that further observations were required. He considered that the term typho-malarial did not imply a belief that enteric and malarial fever were combined, the typhoid state being common to many diseases. He might say in answer to a previous speaker as to how Government might reduce disease on service that the results of recent expeditions had been most instructive in many ways. The first had been fitted out regardless of expense with the result that the native troops and followers had been much more healthy than the average of men in cantonments, although they were constantly marching through deep snow, and had to endure very much on the country through which they pass. The second expedition gave similar good results for the native troops; but the British troops, especially the 1st King's Royal Rifles, who were young troops fresh from England, and under unfavourable circumstances, suffered severely, giving 1,690 admissions per 1,000 per annum as against 525 per 1,000 for the native troops. It was also interesting to know that this last expedition lost more men at the hands of the enemy than from disease. Where there is high jungle tableland, the fever, although very general, yields to treatment, and the mortality is very low. If there is much damp and exposure the type of the disease from biliary complication seems to change, and it becomes more continued and more fatal, and requires the most careful nursing while the convalescence is prolonged and the recovery retarded, and without a complete change of climate the sufferer is rarely fit for active service.

Brigade-Surgeon Robert Pringle, Her Majesty's Bengal Army, said:—The question of the increase of enteric fever in India is one which

must be studied with reference to the physical conditions of the health. Meerut was an instance of good drainage from good waterfall, with a terrible prevalence of malarial fever from the inundation of the canal water; here enteric fever is naturally less, though ordinary malaria is more prevalent. In Lucknow, where these conditions differ and every facility is available for soil and water pollution, we have true enteric fever in its highest prevalence.

The game of lawn-tennis, from the conditions under which it is enjoyed, is most favourable to the ordinary form of malarial fever, the severity depending on the state of the secretions: if the patient is temperate and in good health, the attack, if taken at once, is invariably slight; if, however, there is chronic biliary derangement from intemperance or other cause, then it is complicated with dysentery and afterwards with abscess of the liver. The febrile diseases of troops on service depend on temperatures of as low as 20° of frost.

Brigade-Surgeon T. Maunsell said:—I wish to speak, not as a scientist or as a statesmen, but as a political sanitarian, as regards the age of enteric fever in India. I spent the greater part of the year 1861 in the Quartier Latin, in Paris, and saw a great deal of enteric fever there; on going to India, in 1862, I failed to recognise the same disease, except in a few mild and doubtful cases; I mean the disease did not exist to any appreciable extent there. In reply to Surgeon-General Marston's question, what can be done to further protect our troops in cantonments or elsewhere, I should like to say that whatever else we may do we should at once attend to and improve the *conservancy* in our stations. I have but recently returned from a tour of service of 5½ years in India, and during that time I did duty in most of our large stations, including Meerut and Lucknow, and I found that though theoretically the system of conservancy may be good that practically it, to say the least, is *very* faulty; on examining it one finds that little or no dry earth is used, the receptacles and filth carts are broken or leaky, and the trenches into which the filth is thrown are not attended to. Regulations say that the filth trenches should be within 300 yards of barracks; that is too close. The great blot in the conservancy of India stations is the "trench system." These trenches exist for bazaar people, punkah, and thermantidote coolies, and workmen of all descriptions, and these trenches dotted about all over the stations become in the rains simply quagmires of decomposing filth. The native troops have nothing but trenches, and the latter are usually so far from barracks that the men, especially on dark wet nights during the rains, will not go so far, but merely visit the nearest nullah. The result need not be described. The bazaars in cantonments are overcrowded to a very great extent, and their sanitation is very bad. One point I should like to draw marked attention to is the fact that the sanitary officer is the cantonment magistrate. Nominally the Deputy Surgeon-General is the sanitary officer, but his time is too much taken up with other duties, and practically the cantonment magistrate, a combatant officer, without any special training, is the health or sanitary officer of the station. A medical officer should be specially told off as sanitary officer in our large stations, and then matters would be very much improved.

Surgeon-Major G. S. Robinson, Scots Guards, said:—Typho-malarial fever is a disease worthy of more investigation. One speaker has alluded to its occurrence in American nosology, implying that it does

not occur in our own nomenclature, whereas it has recently been admitted. It occurred frequently in recent Egyptian campaigns, and the name accurately describes its character. It does not, however, seem to me a scientific term, as a combination of two specific fevers does not constitute a separate disease.

That it differs from ordinary enteric fever in important respects is undoubted; especially as to prolonged incubation and prolonged convalescence. On the return of troops from Egypt in 1885 several cases occurred three or four months after exposure to the disease. Of course it is difficult to certify that there has not been recent contamination, but several cases occurred where this did not appear to be the case. I believe the fact was noticed at the time by the head of the Statistical Department of the Army.

Another point in which the disease differs greatly is in the occurrence of an intermittent fever in which the temperature rises two or three degrees every night, after it has fallen, as in the ordinary enteric fever. Altogether it seems to me that the exact origin, nature, course, and treatment are well worthy of more attention from military surgeons; more especially as it does not appear to be recognised as a separate disease by the text books I have consulted, though so mentioned in our official nomenclature.

Dr. Godfrey (U.S. Marine Hospital Service) said:—I wish to refer to the legitimacy of "typho-malaria" as a name.

A series of cases observed in the hospital of which I have charge, in which the typhoid fever was interfered with so as to cause suspicions of mixed disease, showed by culture-methods, and microscopic examination that the patients were all invaded by the bacillus of Eberth and the plasmodum of Savaresse. These patients were all from one floor, had drunk the same water, and been subjected to the same miasm.

In America those places are most exempt from typhoid fever that are supplied with rain-water held in underground cisterns.

Brigade-Surgeon Henry Skey Muir, Medical Staff, said:—Typho-malarial may or may not be a good name, but for the safety of the soldier we should do well to look at doubtful cases as belonging to the graver (or enteric) fever. At Meerut, during this year, in April and May, there were 16 cases, with nine deaths, amongst the troops, besides the cases of two ladies and one officer, all terminating fatally. The ratio of deaths would point to the probability of the disease being true enteric.

Now as to prevention. Defective conservancy being one of the known causes of enteric, it must be grappled with, sooner or later, by Government, as local authority is not sufficient, from want of money.

Water being another source, it is of paramount importance to look to wells more carefully. At a hill station, of which I have recently been in charge, there is an annual outbreak of enteric which, in my individual opinion, is contracted on the march up from Saharanpore, from water drawn from wells contaminated by natives.

Milk has not been referred to during the discussion, but considering it as an undoubted cause, something must be done towards a pure milk supply, and an experiment is now being carried on in Bareilly (where enteric has been for some time prevalent), by the establishment of a dairy farm, the results of which will be watched with interest.

Professor Cayley said:—One of the modes of spread of typhoid fever, cholera, and other diseases which probably depend upon the introduction of a definite poison into the system, is by means of the dust carried in the atmosphere. This applies to India and nearly all Oriental countries. Everywhere in the East the people, as a rule, use the open fields and all open spaces as latrines, and the whole atmosphere is always more or less pervaded by a fæcal smell, depending chiefly upon the presence of actual fæcal matter in the form of dust, which during certain seasons blows up in clouds and pervades everything, contaminating air, food, wells, and sources of drinking water.

In India typhoid fever prevails chiefly in the hot dry months before the rain, and again in the drying-up months after the rainy season.

Very probably the present method of dry earth conservancy instead of open sewers increases this danger.

One other point with regard to the increase of enteric fever of late years. We find now that many more young officers die of *fever* during their first year of service in India than was formerly the case, and this is not because they expose themselves more at outdoor games as lawn-tennis, but they die from *enteric* fever; and in former years, 20 or 30 years ago, there was no such liability to enteric fever among young officers.

Professor Notter, in reply, said:—Brigade-Surgeon Staples and myself agree in our conclusions. The figures he gave agree closely with mine. I laid very particular stress on the *young* and *recently* arrived soldier; and especially on the latter condition, which appears to have even a larger influence than the age, and as to this I appeal to the figures I have placed before you. Surgeon-General Marston asks, if disease depends on a specific cause, how are we to prevent it. I answer by studying the environment of the specific cause. Take the cholera bacillus, we know it will not grow in an acid medium. We know that the stomach is alkaline after fasting, and therefore in a condition to allow the passage of the organisms. The practical bearing of this is to use acid drinks, and not to enter a hospital when the stomach is empty; future research will tell us what are the conditions most favourable to Eberth's bacilli. I wish again to draw attention to the condition of soil, to the presence of soil heat and soil moisture, and as a practical conclusion to say, dry your soil and endeavour to control the variation in the water-level. I do not think that the cases quoted by Brigade-Surgeon Harvey are really cases of enteric, the mortality is against it; the fact of natives not suffering is stated on uncertain evidence and only from hearsay; they were probably not enteric cases, but of a typhoid malarial nature such as Dr. Godfrey has spoken about. I could draw attention to the pollution of wells by surface washings as being a cause of enteric fever in India, and Dr. Godfrey's experience bears me out in this. I have already, I trust, foreshadowed Dr. Cayley's remarks in my paper, and in conclusion I beg to state that I fully agree with Dr. Muir in his observations.

Dr. Davies, in replying, said:—I notice that nearly all the speakers appear to endorse the pythogenic theory of origin. I am glad to see this, as it is a justification for my bringing forward and dwelling on the fact that the experience of medical officers in the army is not in accordance with the current teaching as to the necessity of a specific contagion.

The main points I desired to emphasise were that some of the most recent bacteriological investigations tend to show that there is not one

micro-organism responsible for the causation of enteric fever, but several differing from each other more or less, though possibly and probably not distinct species; and that this harmonises with the clinical and practical experience of every medical officer that there is more than one form of fever met with in campaigns and described as enteric, typho-malarial, &c.; the explanation suggested being that evolution is the factor that causes these variations.

Dr. Squire, in reply, said:—I will first answer the remarks of Surgeon Davies, who states that he and I are at one in our idea of the origin of enteric fever, except in the matter of terms. But this matter of terms is somewhat important, for I believe that more than one disease is included in the returns of enteric fever. If we are to call all these diseases enteric fever, I do agree with Dr. Davis that enteric fever may have a pythogenic origin. But one of the main points of my paper is that we do not sufficiently distinguish the fevers which occur in camp, and although I am ready to allow that some of the fevers wrongly included under the name of enteric fever may have a pythogenic origin, I believe that true enteric fever has a specific origin, and is spread from the sick to the healthy.

Surgeon Davies has mentioned that at Suakin, in 1884, there was no enteric fever, whilst in 1885 it did occur, although in both cases condensed water was used.

I am not aware of the conditions in 1884, but in 1885 the regiment which showed the first cases of enteric had come from Cairo, where enteric fever existed, and spread later to the other troops. Thus, we do not require to suppose that enteric fever originated *de novo* at Suakin. My post mortem examinations, however, showed clearly that there was more than one morbid condition being returned as enteric.

This leads me to say a few words on the subject of typho-malarial fever which has been brought up by several of the later speakers.

I agree that the term might be a useful addition to our returns if we can first decide on its definition. At present it is used by different men to describe several distinct morbid conditions.

The nomenclature of the Royal College of Physicians places it under the heading of enteric fever, as a variety of enteric fever. My belief is that the term should be restricted to cases of malarial fever, which simulate enteric fever in their symptoms. True enteric fever we know may be modified by a malarial cachexia, especially in the way of prolonging the incubation and protracting the convalescence, but for this no new name is required. The disease is still enteric fever, and if we wish to record its complication with malaria we may call it *malarial enteric fever*. But when a disease is almost indistinguishable in its symptoms from enteric, though due to different causes and presenting different pathological changes, it may be well to distinguish it by some separate name. That such a fever exists is proved by my observations at Suakin, as well as by the experience of so many medical officers in India. If we can restrict the term of typho-malarial fever to these cases, by all means let us adopt it, but at present its use without proper definition only serves to increase confusion. I endeavoured to give a clear definition and clinical history of this disease in the International Medical Journal for April 1887. If, as I suppose, typho-malarial fever differs from enteric in its cause and in its spread—for typho-malarial fever is not infectious, and enteric is—it is important that these fevers should be

differentiated. Do not let us go back to the old idea of a hybrid disease, or suppose that a new disease is produced by the poison of enteric fever combined with that of malarial fever. I am glad to have so many endorsements of my contention that camp fevers still include conditions as yet imperfectly understood.

Friday, 14th August 1891.

The Chair was successively occupied by

The Vice-Presidents of the Section.

Prophylaxie de la Tuberculose Pulmonaire; Mortalité par Phtisie dans l'Armée Belge.

PAR

le Docteur V. Logie, Médecin de Régiment au 3me Lanciers, Bruges.

Au moment où le Congrès examine les "Conditions hygiéniques des soldats dans les garnisons," je prends la liberté d'appeler votre attention sur le plus grand fléau de la plupart des armées en temps de paix, la tuberculose pulmonaire et sur ce qu'il y a de mieux à faire, à mon humble avis, je ne dirai pas pour l'extirper, mais pour en atténuer les ravages autant que faire se peut.

Ces ravages, quoiqu'on puisse dire, ne sont pas assez connus, non pas par les médecins, mais par ceux que les médecins doivent inspirer et de qui émanent les mesures ou les améliorations que nous recommandons.

Lorsqu'on cherche à améliorer les conditions hygiéniques du soldat, je crois que s'il est nécessaire de se préoccuper de toutes les maladies et épidemies qui peuvent se déclarer en temps de paix, des mesures à prendre à l'occasion d'une guerre qui peut éclater, il est tout aussi nécessaire, urgent même, de se préoccuper de la gravité et de la prophylaxie d'un mal, qui est, pour l'armée surtout, une peste incontestable, universelle et permanente, et, qui ne nous émeut peut-être pas suffisamment, précisément parcequ'elle est permanente, et à côté de la quelle toutes les autres maladies des armées ne viennent qu'en seconde ligne, quelque dignes qu'elles soient de notre attention.

Permettez moi, donc, d'indiquer les mesures sur lesquelles il y a lieu, me semble-t-il, d'insister particulièrement en vue de combattre ou d'atténuer le mal en question, dont je commencerai par établir la gravité dans l'armée Belge, d'après une statistique de 30 ans, dressée par l'Inspection générale du Service de Santé de l'Armée.

Depuis 1862 la mortalité par phtisie dans les hôpitaux n'a jamais été inférieure au cinquième, a presque toujours atteint le quart, et a même dépassé le tiers de la mortalité générale.

De plus, à côté des phtisiques qui meurent dans les hôpitaux, il y en a quantité d'autres qui sont pensionnés, et vous savez ce qu'il advient de ces derniers. Ne succombent-ils pas tôt ou tard à la tuberculose? Autant vient donc les considérer comme morts.

En faisant le relevé des déchets, à ce point de vue, nous sommes en droit de déclarer *que la perte totale par tuberculose pulmonaire que subit annuellement l'armée Belge depuis* 1868—la statistique ne donne pas les réformes pour phtisie avant 1868—*n'a jamais été de moins d'un quart, a dépassé plusieurs fois le tiers, et même la moitié de la mortalité générale*, et, cela, sur une population triée, choisie! Le nombre d'hommes refusés annuellement, allant constamment en augmentant, était en 1889—dernière année de la statistique—de 190 sur 1,000 hommes visités!

De même qu'il y a moins de malades et de morts en général qu'autrefois, il y a aussi moins de décès par phtisie; mais ces deux diminutions sont loin de marcher de pair. Depuis 1868 la diminution de la mortalité générale est de 62 pour 100, alors que le déchet par phtisie n'a diminué que de 16 pour 100. En d'autres termes, au lieu de 100 hommes, par exemple, mourant en 1868, à la suite de toutes les maladies prises indistinctement, il n'en meurt plus que 38 en 1889, tandis que pour 100 hommes succombant à la phtisie en 1868 on en perd encore 84 actuellement par cette affection.

Il arrive certainement à tous les médecins de voir avec surprise ou avec stupéfaction la phtisie s'attaquer à des personnes qui, sous tous les rapports, leur paraissaient être les dernières sur les quelles le fléau dût s'abattre. Soyez persuadés, MM., que cette douloureuse stupéfaction est particulièrement reservée aux médecins militaires.

Nous avons lieu de croire que ce qui existe dans l'armée Belge se passe à peu près dans les autres armées. Dans tel pays on réforme ou l'on éloigne un peu plustôt que dans tel autre ceux que menace la tuberculose, et les statistiques peuvent bien, de ce chef, révéler quelques différences, mais la vie militaire, en temps de paix, offre, pour ainsi dire, partout les mêmes dangers, au point de vue dont il est question, et, dans tous les cas, donne particulièrement et largement prise à la phtisie. Il y a là une situation d'ordre ou d'intérêt général ou international, surtout par ce temps de service militaire de plus en plus universel.

Que faire, que peut l'hygiène militaire contre ce mal si répandu? Ne nous attribuez pas d'illusions et permettez que, sans entrer dans des détails, ni même dans la discussion des causes, sans méconnaître les tentatives géniales et autres de prophylaxie de ces derniers temps, sans perdre de vue l'influence que la politique elle-même exerce indirectment sur le bien-être du soldat, permettez que nous vous présentions immédiatement nos conclusions ou vous indiquions les mesures que nous considérons comme les meilleures ou les moins imparfaites.

I. Ecarter plus sévèrement que jamais du service actif tous les hommes qui paraissent faibles de complexion. Tenir compte, plus que par le passé, de l'aptitude aux services auxiliaires.

II. L'encombrement, qui vicie l'air dans sa composition chimique et microbienne, étant la caractéristique inévitable de l'habitation du soldat, en neutraliser les effets le plus possible.

Depuis long temps on a compris qu'il n'est pas bon que la troupe n'ait qu'une chambre à habiter, laquelle, étant toujours occupée, ne peut jamais être parfaitement aérée, nettoyée ou désinfectée comme elle devrait l'être. On a commencé par créer des salles de lecture ou des réfectoires à part. Nous croyons que, quelque soit le cube d'air, l'avenir est à la séparation ou à la création de locaux distincts pour le jour et pour la nuit, indice des premières lueurs d'hygiène chez tous les peuples, préoccupation du simple particulier, de tous les hommes au sortir de la misère.

L'accès des chambres à coucher étant interdit le matin, le plustôt possible, elles seront largement ventilées jusqu'à l'appel du soir, beaucoup mieux qu'elles ne peuvent l'être, aujourd'hui, par les systèmes de ventilation les plus perfectionnés.

L'atmosphère des salles occupées, le jour, sera renouvelée de même pendant la nuit.

Les salles ou couloirs d'ablutions seront adossés ou contigus aux susdites chambres, on plus à proximité qu'ils ne le sont généralement.

III. Instituer un prix d'hygiène ou de propreté—propreté du corps, du vêtement et de l'habitation—honoré à l'égal du prix de tir et des plus belles distinctions ou récompenses.

IV. Le soldat étant particulièrement exposé aux refroidissements, c'est en supprimer ou atténuer une cause essentielle que de le vêtir de telle façon que son vêtement—à part la capote ou le manteau—ne soit pas à-peu-près le même au cœur de l'été comme par l'hiver le plus rigoureux.

V. Améliorer sa nourriture et la varier plus qu'on ne le fait généralement. Laisser au soldat le bénéfice réalisé par les fournisseurs intermédiaires.

VI. Laisser le moins longtemps possible à la caserne en remplissant rapidement les formalités administratives et y isoler plus qu'on ne le fait, les militaires proposés pour la réforme à cause de phtisie.

VII. Le médecin en faisant la visite générale, recherchera, non seulement les vénériens et les galeux, mais portera surtout son attention sur les hommes que lui paraissent maigrir et pâlir depuis quelque temps.

VIII. Faire comprendre aux hommes, autant que faire se peut, que, si la vie militaire fortifie, retrempe et assouplit le corps, elle expose particulièrement à certaines affections et notamment à la phtisie, dont il faut se garer en évitant les excès, la malpropreté, l'inconduite, les mauvaises nuits passées à la salle de police, en un mot, tout ce qui ce affaiblit le corps et donne plus de prise au mal en question.

IX. Cela nous conduit à la mesure ou au motif qui est la justification même de notre humble communication, c'est la nécessité de

dissiper l'ignorance du mal, de faire sortir la vérité du milieu trop restreint ou trop spécial où elle est confinée. Il faut qu'elle soit connue, appréciée davantage par ceux-là mêmes qui sont appelés à voter ou à accorder les mesures ou les améliorations recommandées. On aurait grandement tort de croire que, parceque les faits et les chiffres, comme ceux qui j'ai cités, ont déjà figuré avec plus ou moins d'exactitude dans des journaux de médecine et autres, de croire, dis-je, que cette mortalité par phtisie dans l'armée soit suffisamment connue.

La vérité est non seulement ignorée par les plus directement interessés, les soldats, mais j'ai pu me convaincre que parmi des hommes très instruits et consciencieux, parmi ceux-là même, par exemple, qui à titre de délégués civils doivent statuer sur l'admission ou le rejet des miliciens, il en est plus d'un qui a été stupéfait devant la petite, mais lugubre statistique qui précède, et que même plus d'un confrère excellent, instruit, sincère—je ne parle pas de ceux qui savent toujours tout—m'a franchement avoué son étonnement. On connaissait plus ou moins le mal, mais on ignorait qu'il fût si grave.

Dès lors n'ai je pas raison de croire qu'il faut saisir toutes les occasions pour mettre en lumière les ravages de la tuberculose dans l'armée? J'ai cru faire de bonne hygiène en essayant de donner à cette vérité la publicité, la consécration d'un Congrès. S'il peut en résulter quelque bien pour nos semblables, pour ceux surtout qui défendent leur pays, j'estime ne pas vous avoir fait perdre votre temps, ni vous avoir détournés de votre mission. Et pour vous dire toute ma pensée, je crois qu'étant donné le caractère universel de la fréquence particulièrement redoutable de la tuberculose dans l'armée, le Congrès ferait œuvre sage, humanitaire et éminemment hygiénique en émettant le vœu que le mal sur lequel nous sommes tous d'accord, et si possible les mesures à prendre—celles qui précèdent ou autres—soient portés à la connaissance de qui de droit: 1° de ceux que décident de l'admission ou du rejet des miliciens; 2° de tous ceux qui, grands et petits, ont voix au chapitre, quand il s'agit du casernement, du vêtement, de la nourriture, en un mot de l'hygiène de la troupe.

DISCUSSION.

Dr. von Coler, Director-General, Medical Department, German Army, sagte:—Den vorgetragenen Principien kann ich mich im Allgemeinen nur anschliessen. Die Schwierigkeit liegt nur in der Ausführung. Die Wissenschaft reicht noch nicht aus, um zu sagen, welcher Soldat ist nur schwächlich und wird sich gut entwickeln und welcher ist tuberculös; das ist rechtzeitig schwer und oft gar nicht festzustellen. Zur Vermeidung der Ansteckung ist in der deutschen Armee im Prinzip alles Erforderliche angebahnt, die grösste Reinlichkeit wird erstrebt, die Montirungsstücke werden desinficirt, die Soldaten werden gewöhnt, in mit Wasser gefüllte Spucknäpfe zu spucken u. s. w. Seit lange wird dieser Angelegenheit wissenschaftlich und administrativ die grösste Aufmerksamkeit zugewendet und ist in voller Verbesserung, wie die Erfolge bereits zeigen.

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Dr. Kirchner, Surgeon-Major, Prussian Army, Hanover, sagte:— Die Frage der Verbreitung der Tuberkulose muss meiner Ansicht nach von zwei Gesichtspunkten in Angriff genommen werden, einmal müssen die Leute in den ersten Monaten der Dienstzeit genau überwacht werden, und zweitens muss dafür gesorgt werden, dass der Auswurf sicher desinficirt werde.

Es ist mit Sicherheit nachgewiesen, dass die grosse Mehrzahl der Tuberkulosen im ersten Dienstjahr, ja im ersten Vierteljahr der Dienstzeit steht. Man muss also nicht nur bei der Aushebung und Ausstellung die Mannschaften genau untersuchen, sondern auch weiter im Auge behalten. Es ist meiner Ansicht nach erforderlich, sie alle 14 Tage zu untersuchen, und vor allem die Leute genau untersuchen, die Husten und Auswurf haben. Sie müssen baldmöglichst der Lazarethbehandlung zugeführt werden.

Sodann muss der Auswurf ins Auge gefasst werden. Die Wege, welche der Tuberkelbacillus wählt, können dreier Art sein. Impfung, Aufnahme mit der Nahrung und Einathmung. Was die Impfung betrifft, so ist ja bekannt, dass sich die Tuberkulose häufig an Verletzungen anschliesst. Ich erinnere z. B. an einen Fall, wo ein junges Mädchen, welches Ohrringe von einer phthisischen Verwandten geerbt und ohne Desinfection angelegt hatte, eine lokale Entzündung am Ohr und alsbald allgemeine Tuberkulose bekam. Dann sind auch die Fälle nicht selten, wo Lazarethgehülfen und Krankenwärter beim Reinigen der mit Sputum gefüllten Gläser, dieselben zerbrechen, sich schneiden und an Tuberkulose erkranken. Ich könnte noch viele Beispiele von derartiger Infektion anführen. Es ist klar, dass hier doch auch der Schwerpunkt auf den Auswurf zu legen ist.

Zweitens kommt die Aufnahme der Tuberkelbacillen durch die Nahrung in Betracht. Milch, auch Fleisch sind nicht selten tuberkulös, viel häufiger, meiner Ansicht nach, als man gewöhnlich annimmt.

Vor allem aber findet die Ansteckung durch Einathmung statt, und das kommt in der Weise zu Stande, dass der Auswurf zertreten, verstäubt und mit dem Staube eingeathmet wird. Tuberkelbacillen sind ja ausserordentlich widerstandsfähig gegen das Austrocknen und können sich also lange Zeit hindurch infektionsfähig erhalten. Es kommt also meiner Ansicht nach Alles darauf an, den Auswurf zu vernichten.

Die grosse Resistenz der Tuberkelbacillen macht jedoch grosse Schwierigkeiten. Die Tuberkelbacillen widerstehen nach den Untersuchungen von Stabsarzt Jaeger der 50 % Kalkmilch, nach Laplace auch der 5 % Carbolsäure und dem 1 ‰ Sublimat. Es kommt hinzu, dass es kostspielig ist, bei einer so langwierigen Krankheit wie die Tuberkulose den Auswurf chemikalisch zu desinficiren. Auch ist das nicht ungefährlich, den Kranken lange Zeit hindurch so gefährliche Mittel, wie die Desinfektionsmittel sind, in die Hand zu geben. Man neigt sich daher auf vielen Seiten der Ansicht zu, dass man vom Desinficiren des Auswurfs überhaupt Abstand zu nehmen habe. Dies halte ich aber für gänzlich unzulässig.

Denn ich habe aus den Berichten der Preussischen Armee den Nachweis geführt, dass die Lazarethgehülfen 3 mal mehr, die Krankenwärter in noch höherem Grade der Tuberkulose ausgesetzt sind als die übrigen Soldaten. Dies ist auch in anderen Armeen, z. B. der französischen, der Fall. Wir haben aber meines Erachtens die Pflicht, die Leute, welche unsere Soldaten pflegen, gegen Ansteckung ganz besonders zu schützen.

Es ist bei uns vorgeschrieben, die Speigläser durch Ausspülen mit kochendem Wasser zu reinigen. Dies halte ich aber für nicht genügend. Denn das Wasser, welches die Wärter aus der Lazarethküche empfangen, ist nicht mehr heiss, wenn es mit dem Auswurf in Berührung kommt. Ausserdem ist der Auswurf so zäh und klebrig, dass er sich durch Ausspülen nicht aus den Gläsern entfernen lässt, sondern dass man die Hände zu Hülfe nehmen muss. Nun ist ja den Lazarethgehülfen vorgeschrieben, sich nach jeder Handreichung zu desinficiren. Allein Gewohnheit an die Gefahr macht gleichgültig gegen dieselbe, auch kommt Bequemlichkeit hinzu. Die Desinfektion unterbleibt daher meistens, und so ist die Ansteckung möglich.

Wir brauchen aber gar nicht die Hände in den Schoss zu legen. Es giebt eine sehr einfache Art der Sputum-Desinfektion. Man braucht den Auswurf nur zu kochen, um die Bacillen sicher zu vernichten. Ich habe gefunden, dass 10 Minuten lange Behandlung des Auswurfs mit strömendem Wasserdampf hierzu genügt. Und ich habe einen sehr einfachen und billigen Apparat angegeben, mit dem der Auswurf in den Lazarethen leicht zu vernichten ist. Er ist dem rühmlich bekannten Soxleth'schen Milch-Koch-Apparat nachgebildet. Es ist ein ziemlich grosser Blechkessel mit zwei Einsätzen, deren jeder 5 Spuckgläser aufnehmen kann. Bringt man die Spuckgläser ½ Stunde vom Anfang das Dampfens ab hinein, so ist allen Anforderungen genügt. Ich habe tuberkulösen Auswurf vor und nach der Desinfektion Versuchsthieren in die Bauchhöhle eingespritzt. Vor der Desinfektion führte der Auswurf sicher in 4 bis 6 Wochen den Tod herbei, während die mit dem desinficirten Auswurf geimpften Thiere gesund blieben.

Man muss meiner Ansicht nach derartige Apparate in Krankenhäuser und Lazarethe einführen. Ihr Preis—etwa 1 Pfund—spricht nicht dagegen. Er ist wahrhaftig gering im Vergleich zu dem Segen, den er zu bringen im Stande ist. Der Apparat ist durch das Wohlwollen des Königlich Preussischen Kriegsministeriums zur Prüfung zugelassen worden; in den Lazarethen in Hannover und Münster wird derselbe geprüft und hat sich vorzüglich bewährt. Ebenso würde die Einführung dieses Apparates in Kasernen von der segensreichsten Bedeutung sein.

Dr. Jules Félix, Hon. Physician to His Majesty the King of the Belgians, drew attention to a point which appears most important. It is not enough to take all necessary measures to destroy or extirpate tuberculosis from armies, but it is also necessary to close all doors by which it can enter.

In Belgium the law directs that in the case of feeble constitutions, without tuberculosis being evidently manifested by lesions, the recruits shall not be accepted in the military service, but be put back for a time and subsequently re-examined by the civil doctors appointed by the recruiting council for that purpose.

If it is not easy to diagnose phthisis in an individual whom the physicians of the council of recruiting do not know, and if there are no positive signs of the second or third stages of phthisis, it becomes much more difficult, sometimes even impossible, to diagnose it in its first stage. On the other hand, it often happens that recruits who have been put back by the physicians on the ground of weak constitution seek to aggravate their symptoms in order to get definitely rejected by that branch of the army to which such recruits would be appointed. Others, who desire a

military career, seek to conceal their symptoms in order to enter the army, in which case the family doctor could give most valuable opinions to the recruiting council. Here we see grave consequences, the entrance to the army of tuberculosis which results from this state of things, and to which the attention of the civil and military authorities should be directed in order to absolutely keep out of the army those young fellows in the first stage of phthisis. There is another point which is not sufficiently brought forward, and that is the method of propagation of phthisis by washing soldiers' linen. In most armies, soiled linen is washed in cold water, from which it follows that a single pocket-handkerchief stained by tuberculosis matter washed in cold water and thrown among other linen is sufficient to contaminate the whole of the soldiers' clothing. It appears, therefore, that the linen should be washed in steam at 100° C. for the bacillus to be destroyed.

Dr. Hambleton, President of the Polytechnic Physical Development Society, said:—I have listened with great pleasure to Dr. Logie's very important paper. The subject with which it deals is one of the most important, if not the most important, that could be brought before this section of the Congress. During the five years 1880–84, there were 6,749 admissions into hospital of tubercular disease (331 deaths, 1,063 invalids sent home from abroad, and 2,356 finally discharged) from the British army. I give these statistics because they clearly show the serious drain which consumption causes in our army, and the urgency for the adoption of any measures that will put an end to it.

Dr. Logie makes some very important suggestions towards the attainment of that object. In calling attention to the necessity for the admission of men of good physique, to the regular medical inspection of the men, and to the good hygienic state of their habits and surroundings, he points out the directions in which measures must be taken to effectively secure the prevention of consumption in military life. I should like to make some observations on these points. And first with reference to the physique: the standard adopted in our army as regards recruits is unscientific and bad, it does not recognise the fact that the girth of the chest increases with each inch of stature, and it is much too low. Brents' medium standard ought to be the minimum required of every man who is placed upon the effective list. It is no objection to say we cannot obtain a sufficient number of recruits possessing that standard, because, as I have shown at the Polytechnic, it is easy to develop the men up to it. The average increase of the chest girth of 100 members of our society was 2 inches, that of the third class being $1\frac{3}{8}$ inches, the second $2\frac{1}{4}$ inches, and the first $3\frac{5}{8}$ inches. The gold medals of the society being given to members who had obtained an increase of $6\frac{1}{2}$, 5, and $4\frac{3}{8}$ inches respectively. It is clear that the increase of the girth that has been obtained by men engaged from 8 to 12 or more hours daily in such occupations as printers, compositors, tailors, clerks, watchmakers, carpenters, drapers, &c. can be very easily obtained by our soldiers. I must point out the fact that this development has not been obtained by gymnastic training. True physical development consists in ascertaining the tendencies of all the conditions to which our bodies are subjected by their habits and surroundings, and in the application of that knowledge to our own protection and advantage.

If, therefore, we cannot obtain the recruits possessing the required standard we must develop them up to it.

Medical inspection should be directed to the ascertainment of the chest-girth, the range of movement, the vital capacity, and the power of inspiration and respiration at certain fixed periods of, say, a month, and those observations should be recorded.

I would point out that Hutchinson's standards are much too low, and that the range of movement should be not less than 4½ inches. There are in our army many conditions that are very injurious to the soldiers' health. I emphatically agree with Professor Welch, of Netley, that consumption in the army is directly produced by the conditions to which he refers in his splendid work on consumption in the army and the inferior physique of the men. I am satisfied that it is easy to practically put an end to this disease in the ranks, or, in other words, to stamp out consumption in the army, and I hope that Dr. Logie's paper and the discussion before this section of the Congress will cause the authorities of all nations to take the necessary measures for that purpose.

Surgeon-General Dr. W. J. de Meyer said:—The several measures which are mentioned by our honoured President and by the author of the paper are taken in the Dutch army, and this with the most satisfactory results.

Tentes et Baraques.

PAR

Monsieur le Docteur Duchaussoy, agregé de la Faculté de médecine de Paris, Fondateur de l'Assoeiation des Dames Françaises.

Lequel des deux est préférable, comme moyen d'hospitalisation temporaire, de la tente ou de la baraque ?

Les perfectionnements que ces deux systèmes d'hospitalisation ont reçus dans ces dernières années, rendent la réponse difficile, si on ne considère que les avantages et les inconvenients de la tente et de la baraque, après qu'elles ont été montées. En effet, au point de vue de l'antiseptie, de l'égalité de la température, de l'aération, et de la résistance aux agents atmosphériques, on peut arriver à des résultats à peu près de même valeur, soit à l'aide de la tente, soit à l'aide de la baraque.

Cependant, il faut remarquer que le renouvellement constant de l'air est plus assuré avec les tentes, à cause de la perméabilité de la toile, et que la désinfection des tentes, construites en fer et en toile, est plus facile et plus prompte que celle des baraques en bois ou en carton.

Mais quand il s'agit d'installer ces deux espèces d'abri, il faut convenir que s'il est vrai qu'on a plus généralement sous la main les matériaux de construction des baraques, il est plus difficile de les édifier avec tous les soins que l'hygiène réclame.

La tente, au contraire, est plus facilement transportable, plus légère, moins dispendieuse et se monte plus promptement.

L'Association des Dames Françaises a préfèré le système des tentes ; mais en faisant subir d'importants changements aux modèles qui ont été employés jusqu'ici.

Ces changements ont pour but de répondre à une destination spéciale. Les tentes de l'Association ne constituent pas des ambulances temporaires sur le champ de bataille ; elles doivent être des *hôpitaux auxiliaires*, loin des champs de bataille. Ces hôpitaux doivent le plus souvent rester plusieurs mois sur le même terrain, cependant il serait facile de les demonter et de les transplanter, si le terrain primitivement choisi devenait malsain.

La tente qui sert de type à ces hôpitaux auxiliaires a été exposée à Paris en 1889.

Nous avons décrit alors tous les details de sa construction et de son aménagement, avec un mobilier tout en fer ; nous ne reproduirons pas ici ces détails, mais pour permettre d'apprécier les résultats pratiques que cette tente peut donner, nous en rappellerons les dispositions essentielles :

Chacune des cinq tentes qui composent nôtre hôpital a des parois doubles, laissant entre elles un intervalle d'un mètre. La tente est longue de 18 mètres, et son ossature entièrement en fer, plein ou creux, suivant les parties, lui donne à la fois beaucoup de solidité et de légèrcté il n'y a pas de colonnes qui la soutiennent à l'intérieur.

Entre les deux toiles il n'existe pas de parquet ; le sol de ce couloir a été simplement battu, puis recouvert d'une couche de gravier. Cette disposition permet d'éviter la trépidation que donneraient les pas des gens de service ; car la majeure partie du service se fait par ce couloir qui règne tout autour de l'espace occupé par les malades.

La monture en fer permet d'augmenter ou de diminuer la hauteur de la tente, suivant qu'on l'emploie en été ou en hiver, ou suivant les moyens de chauffage dont on dispose.

Dans les circonstances ordinaires, le plafond se trouve à une hauteur de 4 mètres 50 au dessus du parquet. En hiver chaque malade peut avoir 24 mètres cubes d'air, si la tente est abaissée ; en été il a 30 mètres cubes si on laisse à la tente toute sa hauteur.

Pendant l'été de 1889, la tente hôpital est restée exposée six mois aux tempêtes de l'été ; elle y a fort bien résisté. Malgré les chaleurs du mois de Juin et de Juillet, la température intérieure y est toujours restée agréable, quoique la tente fut traversée sans cesse par un très grand nombre de personnes. Ce résultat était dû : à la hauteur de la tente ; à la ventilation par le faîte, et à la resistance que la couche d'air périphérique emprisonnée entre les deux toiles, opposait à la chaleur extérieure.

Mais on devait se demander si la tente se comporterait aussi bien pendant les gelées et les tempêtes de l'hiver ; s'il serait aussi facile d'y maintenir la température nécessaire aux malades, qu'il avait été facile d'y éviter l'excès de chaleur et l'air confiné en été.

Ces questions ne pouvaient être résolues que par une expérimentation sérieuse, faite au cœur de l'hiver, dans la tente transformée en hôpital réel, et pleine de malades.

Cette expérience a été commencée le 18 Janvier 1891, dans une campagne des environs de Paris ; elle a duré jusqu' au 20 Mars. Les chambres des quatre coins de la tente ont été consacrées au service ; l'intérieur de la tente a reçu 13 malades et un gardien ; en tout 14 lits.

Les résultats du traitement médical et du traitement chirurgical ont été excellents ; il n'y a pas lieu de nous en occuper ici ; *les conditions hygiéniques et météorologiques*, étudiées avec beaucoup de soin, puis contrôlées par les médecins et les chirurgiens les plus éminents de Paris me semblent présenter un intérêt tout particulier. Je vais tâcher de vous les faire apprécier succintement.

Pendant toute la durée de l'expérience, la température de l'intérieur de la salle s'est maintenue à environ 18° centigrades au dessus de zéro, même quand la température extérieure était tombée à 11° au-dessous de zéro, comme cela est arrivé le 3 Mars.

L'air compris entre ces deux toiles, qui forment le pourtour de la tente, ne présentait ordinairement que 5° ou 6° au-dessus de zéro ; il y a eu cependant des variations assez considérables, suivant la température extérieure ; on peut ainsi apprécier le rôle d'intermédiaire régularisateur que ce matelas d'air jouait, par rapport à l'air intérieur de la tente.

Les thermomètres placés aux sommets de la tente intérieure marquaient une température plus élevée que ceux qui étaient au même niveau que les malades.

Quant aux *observations hygrométriques* elles ont confirmé ce qui avait déjà été reconnu pour les autres systèmes de tentes à doubles parois : L'humidité a toujours été modérée à l'intérieur, même en temps de neige et de pluie.

Comment se fait la circulation de l'air dans la tente ?

Les observations ont été faites et notées au moyen de feuilles légères de papier flottant aux ouvertures du sommet de la toile extérieure, côté sud et côté nord, et en face du treillage métallique de la toile intérieure.

Des feuilles semblables étaient placées dans les couloirs et au-dessus d'eux, à l'endroit où les deux toiles se rapprochent. On a observé que le mouvement de l'air se faisait presque exclusivement de l'intérieur vers l'extérieur, à fort peu d'exceptions près.

Dans ces couloirs le mouvement était très peu appréciable ; mais à l'endroit du raccord des deux toiles, le mouvement se faisait de l'intérieur vers les couloirs et il se produisait quelquefois en sens contraire, faisant ainsi va et vient. Dans le bas du rideau de porte, l'air pénètre du dehors, ainsi que par les innombrables et imperceptibles pores du tissu des toiles.

La plus petite partie de cet air pénètre dans les poêles et en active la combustion ; le reste s'échauffe aux parois et se répand dans la salle où il est mêlé par le mouvement imperceptible et continuel. Ce mouvement ascendant emporte par les treillages les émanations de la salle, dans l'espace supérieur, au sommet, entre les deux toiles et les écoule ensuite par les ouvertures des deux pignons.

Comme il y a dans la tente un va et vient continuel, l'air chauffé donne la même sensation agréable que l'air des champs dans la belle saison, et ne ressemble en rien à l'atmosphère chargée des hôpitaux.

Toutes ces observations ont été verifiées par le Docteur Gruby.

Résistance de la tente aux ouragans.

Un fort ouragan n'ébranlerait-il pas la tente et ne porterait-il pas préjudice aux malades? La tente a parfaitement résisté à la tempête du 23 Janvier, qui a sévi à raison d'une vitesse de 80 kilomètres à l'heure à l'observatoire de Montmartre et de 100 kilomètres au sommet de la Tour Eiffel; et personne n'en a souffert. Une simple corde fut attachée aux deux pignons et fixée aux murs voisins pendant cette tempête; on ne fit pas usage des piquets et des contreventements).

Résistance de la tente à la neige.

La neige n'a pas séjourné sur la tente; elle y fondait à mesure qu'elle tombait, pendant qu'elle est restée trois jours sur le sol.

Chauffage de la Tente.

La tente a été chauffée jour et nuit par deux poêles calorifères, alimentés par du coke, ou par l'anthracite; l'un est placé au nord, l'autre au sud. La fumée sort par un tuyau qui parcourt la tente du sud au nord presque dans toute sa longueur, pour aboutir au pignon du nord. L'air n'est nullement vicié par les gaz de la combustion, étant, comme on l'a vu, constamment renouvelé, doucement et uniformément, sans courants nuisibles, de sorte que la respiration des malades n'éprouve aucune gêne.

Ce mode de chauffage peut donc, à quelques modifications près, convenir parfaitement à la tente; quoique la combustion soit lente, la masse et la circulation de l'air sont telles que les malades n'en ressentent aucun inconvénient. Il est à remarquer, cependant, que malgré la couche d'eau dont ces poêles étaient enveloppés, et malgé l'emploi des petits paravents, il y avait des moments où la température s'élevait à 23 degrés centigrades aux deux extrêmités de la salle, près des poêles.

Cet excès de température, bien qu'il ait été de très courte durée, peut avoir de graves inconvénients pour certains malades. Il faut encore noter que les vents violents peuvent produire des oscillations dans le long tuyau qui est commun aux deux poêles et qui traverse toute la tente. Il en résulte que ce tuyau doit être l'objet d'une surveillance continuelle.

Tous ces inconvénients disparaissent quand on fait usage du chauffage règlementaire de la tente; c'est-à-dire d'un calorifère placé en terre à l'extérieur de la tente et dont les tuyaux conduisent à l'interieur de l'air chaud ou de l'eau chaude.

Plancher de la Tente.

Pendant l'essai d'hospitalisation la salle des malades a été munie d'un plancher, posé sur des pièces de bois, qui laissaient un vide de 30 centimètres entre ce plancher et le sol. Ce plancher était lavé tous

les jours avec une solution phéniquée ou une solution de sublimé, et tenu dans une parfaite propreté. Si l'expérience avait duré plus longtemps, on eût pu le couvrir d'un tapis de linoleum. Nous n'avons eu qu'à nous louer de ce plancher simple.

La question du plancher des tentes se présente sous divers aspects :

1°. Faut-il un plancher ? Peut-on se contenter du sol, en prenant certaines précautions contre des germes de maladie et contre les émanations de la terre.

2°. Les planchers fixes, posés sur des traverses de bois, sont-ils préférables aux planchers disposés par panneaux carrés et articulés comme dans le système Von Dœcker ?

Quand le sol sur lequel repose la tente a été fortement battu, qu'on l'a entouré d'un glacis pour l'écoulement des eaux, qu'on l'a recouvert d'une couche de sable et de gravier de 25 centimètres, et que tous les jours on sème sur ce gravier une couche de seiure de bois ou de sable fin, additionnés d'une légère solution de chlorure de zinc, et qu'on remplace chaque jour ce sable fin, nous croyons qu'on a réalisé des conditions d'hygiène très-suffisantes. On augmentera encore la valeur de ces conditions si, entre les lits des malades, et même entre le lit et le sommier, on place des morceaux de toile cirée ou caoutchoutée imperméable. Mais il faut, pour s'en tenir ainsi au sol, que la tente ne soit pas placée sur un terrain marécageux, ou chargé d'humus, ou simplement humide, et que ce terrain soit entouré de pentes qui ne laissent pas séjourner l'eau des pluies. Ces conditions, du reste, ne sont pas moins nécessaires aux baraques.

Dans les circonstances opposées, un plancher est utile, sauf dans le couloir qui règne autour de la tente et par lequel on fait le service.

Les planchers fixes ont l'avantage de pouvoir être établis facilement dans toutes les villes et les villages, sans qu'on soit obligé de les transporter avec la tente, comme cela est nécessaire pour les planchers à compartiments articulés. D'ailleurs quand ces derniers ont servi une fois, il est rare que les raccords des différents morceaux se fassent exactement.

Le transport de ces planchers est très encombrant et dispendieux, malgré toute l'ingéniosité des caisses de Von Dœcker.

Nous croyons donc que pour une hospitalisation temporaire sous la tente, le plancher fixe sera bien plus souvent employé que les planchers à compartiments.

En resumé, cet essai qui a duré 32 jours, dans la plus mauvaise saison de l'année, a donné des résultats concluants. Nous pouvons dire, qu'envisagée comme moyen d'hospitalisation temporaire, la tente-ambulance de l'Association des Dames Françaises, avec sa grande capacité, la solidité de sa charpente en fer, ses deux toiles separées par un intervalle d'un mètre, constitue un des meilleurs moyens de créer rapidement des hôpitaux auxiliaires. Nous ajouterons que c'est un des moins dispendieux et un des plus agréables pour les malades, à cause du peu de bruit avec lequel se fait le service, du demi-jour suffisant cependant pour lire qui règne dans la tente, à cause du renouvellement

incessant de l'air, et de l'absence de toute mauvaise odeur, même quand cette tente est pleine de malades depuis plus d'un mois.

DISCUSSION.

Dr. Félix congratulated Dr. Duchaussoy on his important communication, and pointed out a simple and economical plan for replacing carpet, linoleum, and planks in temporary hospitals, viz., to cover the earth with a layer of cement whenever it can be obtained.

In France, Germany, Italy, England, Belgium, &c. the use of cement is general.

It is sufficient to dig out to a depth of 10 to 15 centimetres, to fill up with stones or gravel, well broken, and lay thereon a bed of concrete about five centimetres thick. This will form a level bed, healthy, easily cleaned. Moreover, the cement floor is very cheap, and can be easily laid down in four hours at the outside.

The Duties of the Medical Staff of an Army engaged in Active Operations in the Field.

BY

Brigade Surgeon C. H. Y. Godwin, Medical Staff-Assistant, Professor of Military Surgery, Army Medical School.

The great development that has taken place in modern armies must lead all members of the various parts of so complex a machine to ponder over the new demands that are likely to be the result of such changes. Not only are the numbers greater than at any former period, and the facilities for a rapid concentration greatly increased, but also the power of the weapons used are rendered more efficacious by being more deadly.

Military officers of all nations are giving their best thoughts to the various problems involved in offensive or defensive operations, whether it be of organisation or of tactics, how best to feed masses of men removed from the usual sources of supply, how to get ammunition and clothing conveyed so that it may be readily within reach; and, while all these and various other matters are forming the subjects of deep consideration, what, may we ask, is being done for the aid and welfare of those members of the army, who, amidst all the exciting scenes and duties fall sick from the exposure and hard work, or come to be classed under the name of "wounded"?

In former years each regiment was complete in itself, with its own hospital and surgeons, who moved with it. The surgeons then had little more to think about than the actual treatment of the sick, as the military authority made all arrangements and did not expect the surgeon

to interfere. Later on, the care of the health of the troops was added to the duties of the surgeon; he became a health officer, and had authority given to him to initiate measures for the prevention of disease, or to remedy it if it had broken out. For this purpose he was authorised to approach the Commanding Officer and offer such suggestions as appeared needful. Then came the period of breech-loading rifles, necessitating quicker movements and new tactical dispositions; under these circumstances, regimental hospital establishments became obstructive and obviously out of place; they were superseded by the more concentrated formation of hospitals for brigades and divisions, administered by medical officers trained in the regimental methods, but who now found that they were called upon to take up the entire management of the hospitals, and upon whom fell the responsibility of organising, moving, and carrying them, also of obtaining their supplies, whether of transport or of other necessaries; and as the regimental orderly was no longer available, a hospital corps was raised and placed under the command of the Medical Officers, who had, therefore, in his dealings with its discipline and interior economy, to acquire all the technical and special knowledge by which such duties are regulated in the army generally—in fact, in these respects he had to be well acquainted with the duties common to all officers of the army, but without their rank to support him.

The various duties which were first experienced in the last campaign in which this country was engaged, led the Medical Officers to feel that though their duties had been greatly increased in responsibility and variety, their power, from want of a properly defined rank, was not equal to the demands made upon them.

The duties which fell upon them then, and would again in any future war, are such as the following:—They are the health officers of the force, with the distinct duty of keeping as large a number of men in health as the circumstances will admit, and by so doing, they give the General the greatest assistance in their power; they have in their charge the whole hospital system of the army, which they administer and direct; they have under their direct command the Medical Officers and men of the Medical Staff Corps, besides all Officers and men attached to them for duty, or who may be patients in hospital. In fact, from the time a man falls out from either sickness or wounds, he passes into the hands of the Medical Staff until he reaches his ultimate destination; thus a very considerable portion of an army in the field passes under the treatment and authority of the Medical Staff.

The duties entailed in administering to the various wants, discipline, and transport of so large a body of soldiers have led the Medical Officers of all armies to seek a more defined status such as will enable them to fulfil these duties with an army in field, both with proper respect to themselves and with ease and cordiality with other officers, especially with reference to those of the Supply Departments, who have been accustomed to look for military authority before complying with medical demands. The Medical Officers of an army require to have such a position as

substantive rank* alone will confer to enable them to go to the Supply Departments and to satisfy their wants without having recourse to other officers for the necessary authority. The Supply Departments are intended to meet the demands of the army; if 10, 20, or 30 per cent. of the strength of the army is in the hands of the Medical Staff, it follows that the latter have good ground for claiming attention on their own authority from the hands of those entrusted with supply, whether of money or of kind; it being always understood that the senior or directing officers of the Medical Staff are subordinate to, and in touch with the general officers, to whom they are answerable for the full and proper discharge of their administrative duties in their respective divisions.

This responsibility of the Medical Staff of an army in the present day is being to a certain extent realised by Military Officers of high position; moreover, as the call upon all ranks in time of war is so great, it is quite recognised that it fully taxes all the energies of the combatant portions of the army to conduct the military operations proper, to transport and feed the fighting ranks, so that when a man through sickness or wounds leaves his place, he necessarily passes into the hands of the non-combatant portion, namely, the Medical Staff. The Medical Staff have therefore been entrusted with a considerable amount of autonomy and power. It is to this I wish to direct attention.

Upon war breaking out, the Medical Staff will have to estimate and provide the necessary hospital accommodation, equipment, and stores, the formation of bearer companies, with their equipment, both *matériel* and *personel*. The military authority will direct their place for sea transport, but meanwhile the interior economy and discipline of the Medical Staff Corps will rest with the Medical Staff Officers. As soon as a landing has taken place, the Medical Officers, subject of course to the General Commanding, will have at once to take their places with their bearer companies and field hospitals in their respective brigades and divisions. The Medical Officers will have no one, as in old days, to direct them, but they will have to use their administrative powers at once; and it depends, I conceive, upon the degree in which the senior ranks of the Medical Staff have grasped the new ideas, whether their department will prove a help or the reverse to the military machine. The young Medical Officers are educated and carefully trained in the duties to be exacted from them; it is upon the Medical Officers of 15 years' service and upwards that will fall the responsibility of making their service a really useful branch of the army.

If Medical Officers are closely studying in these times of peace the evolution that is going on in their own department, as is evidenced by the new regulations promulgated from time to time, and are studying the effect of these changes and the administrative demands that will fall upon all Medical Officers holding charges, they, when the time comes, will be prepared to meet the occasion. Let me instance a Surgeon-General of a Division on the Staff of the General Officer; under his own command will be a considerable number of Medical Officers, three field

* This does not, and need not, include title.

hospitals, two bearer companies, &c. To prevent confusion, he must be prepared at once to arrange the relations and duties of the various units who will all look to him for guidance and direction, and must also be able to submit to his General a well thought out scheme of medical relief. If, however, he be confused in mind and uncertain, for instance, as to the purposes and proper functions of a bearer company, the details of its constitution and its mode of working, &c., this confusion of thought will spread at once to those under him; if, on the other hand, he has thought out these matters, and is prompt in his action and capable of dealing quickly and summarily with the discipline of the Officers and men under him, a confidence will be quickly infused into the minds of all, and a spirit of energy and initiative power will be engendered that will render the Medical Department of the division respected and valued by all the Officers and men composing it.

It is with these views that I advocate the extreme and pressing need, wherever sufficient Medical Officers and men are stationed together, that a regular weekly exercise during the summer months should take place in the formation of a bearer company and the field exercises connected with it, not omitting tent-pitching—so that the Officers and men, and especially the Non-Commissioned Officers employed in offices, should accurately know their places; and, indeed, I may say that the value of the administrative Officer as an Officer, in the present day, must in a great measure be tested by the interest he personally displays in seeing such exercises carried out intelligently by those under his command and for whose efficiency he is responsible. It is greatly to be desired that in our summer manœuvres, properly equipped field hospitals should be furnished, so that Medical Officers might get to know something about their constitution, the mode of packing, dividing, and pitching them. At the present time a large proportion of the Medical Staff is probably quite unacquainted with the practical working of a bearer company or field hospital, and only acquainted with these units so far as is laid down in codes of regulation. In the combatant portion of the army, it has been found necessary to depart from a strict system of seniority in promotion when command is in question; we, too, in the Medical Staff must be prepared, when so much is expected from us, to see a like principle introduced, and, indeed, our efficiency and very life depends upon it.

In conclusion I submit that the efficiency of the Medical Department of an army will depend upon the zeal and seriousness of purpose felt by its members; that in a future war, the success of such autonomy as we possess at present will be in a great measure dependent upon the initiative and administrative powers possessed by the senior Officers; and, however qualified the members individually may be as physicians and surgeons, this will avail them little, if their organisation is so imperfect that the unfortunate soldiers who may happen to be wounded only reach them when half dead. Indeed, it may be said that the primary duty of the Army Surgeon is to keep the army in health; secondly, when in a supreme crisis, masses of men are lying wounded, his special knowledge and training should come to their rescue, and by

his organisation he should be enabled to bring them speedily and conveniently to the places where they may receive the benefits of an intelligent and enlightened skill.

On the Ambulance Organisation and Medical arrangements of an English Army Corps in the Field.

BY

Surgeon C. J. Addison, Army Medical Staff.

In this paper I intend to give a sketch of the ambulance organisation and medical arrangements of an English Army Corps in the field. I purpose to treat this highly interesting subject in such a way that those who have not made it their study may be able to realise what ambulance aid in the field consists of.

Ambulance organisation, equipment, and transport mean the general arrangements by which "first aid" and proper transport is given to the soldier, whether wounded in action or suffering from sickness, or accident, until his arrival at a "base" or some other general hospital.

It may not be out of place here, to consider the conditions under which the severely wounded soldier is found after having been struck down in the fighting line, as enumerated by Surgeon-Major G. T. H. Evatt, M.D., Medical Staff.

1. Falls wounded; dressed by the battalion surgeon.
2. Collected to "dressing station" by bearer company.
3. Conveyed to "field hospital."
4. Handed over to "stationary hospital."
5. Proceeds by convoy to the "base hospital."
6. Transferred to "hospital ship."
7. Conveyed to England, landed, and placed in "military hospital" at Netley or elsewhere.

It is my intention to treat consecutively the various points into which this subject is divided.

Military ambulance organisation appears to have been first taken up, and elaborated by Drs. Larrey and Percy, both prominent medical officers of the French Army, who had considerable war experience at the time of the French Revolution and during the severe fighting that took place under the Great Napoleon.

To Dr. Percy is accredited the formation of a corps of stretcher bearers, whose duty it was to collect the wounded from the fighting line, and to remove them to "dressing stations" out of the zone of fire; whilst to Dr. Larrey belongs the idea of originating the provision of carriage transport for the rapid removal of wounded soldiers from the "dressing stations" to the "field hospitals."

Practically this system is in vogue now, but more perfectly and clearly organised, and the German Medical Service has since completely

developed it, so that it is the model on which most of the European standing armies base their medical arrangements. This would seem to be the result of their great experience during the past 20 years.

In short, the course pursued is, to relieve the fighting line of wounded, and to transfer the seriously injured to the hospitals on the lines of communication or at the base of operations.

It must be understood that the highest unit of our military organisation is that of an army corps, and a great army would be composed of several such army corps; if, therefore, the detail of a single army corps be perfectly understood, then the arrangements necessary to a large army can be readily grasped.

Normally, the total strength of an English Army Corps with "attached Cavalry Division" is about 41,500 men, 16,500 horses, 90 guns, 420 carts, and 1,153 waggons, with 8 bearer companies and 13 field hospitals, the whole of which are under the command of the General Officer, on whose staff is a surgeon-general responsible for the efficient performance of the medical services. By the latest regulations, this surgeon-general, who is the principal medical officer with an army corps in the field, is now no longer at the front with the General Officer commanding the force. His place is now on the lines of communication. If these are extended to any great length, he is assisted by a deputy surgeon-general.

It will serve as a guide if I here roughly state the approximate number of officers of the medical staff, and warrant officers, non-commissioned officers and men of the Medical Staff Corps present with an Army Corps in the field. It is as follows:—

188 medical officers and quartermasters.
1,284 warrant officers, non-commissioned officers, and men of Medical Staff Corps.

This total does not include the regimental stretcher bearers or the medical establishments on the lines of communication and at the base.

An Army Corps in the field consists of three "Divisions," comprising all arms of the Service; also a "Cavalry Brigade," and a reserve of Royal Artillery and Royal Engineers, the two latter called, as a body, the "Corps Troops."

The organisation of a "Division of Infantry in the field" is as follows:—

Divisional Staff:
2 Brigades of Infantry.
1 Divisional Squadron of Cavalry.
3 Batteries Field Artillery.

Divisional Details:
1 Divisional Reserve Ammunition Column.
1 Field Company, Royal Engineers.
1 Company Army Service Corps.
1 Field Hospital (in Reserve).

And that of a "Brigade of Infantry":—

Brigade Staff:
4 Battalions of Infantry.
2 Machine guns.
1 Company Army Service Corps.
1 Bearer company.
1 Field hospital.

Practically, to each regiment and battery of Royal Artillery is attached a medical officer. He has placed under his command two soldiers per company, who have with them stretchers, surgical haversacks, and water-bottles. These give "first aid" to the regimental wounded in the fighting line, and are known as the "Regimental Ambulance Detachment." These men must not be confounded with the "divisional bearer companies" which I shall mention subsequently. The medical officer has at his disposal "field medical and surgical panniers," a "field companion," with water-bottle, surgical haversack, and a circular tent. With smaller bodies of troops he has only a "field companion," water-bottle, and surgical haversack. He is attached to the regiment, battery, or company throughout the campaign, and is the adviser on sanitary matters, and a staff officer of the commander of the unit.

After the battalion medical officer has given "first aid" to the wounded in the fighting line they are conveyed to the "collecting station" by his "regimental stretcher bearers," and there handed over to the "Brigade bearer company." These men do not go beyond the "collecting station," but after completing their duty return again to the fighting line.

Two "bearer companies," a separate organisation as subsequently detailed, are attached to each of the three divisions of an army corps. These are, in reality, divisional medical units, commanded by the general and principal medical officer of the division, who is a deputy surgeon-general; also two bearer companies are attached to the "Cavalry Division." This makes a total of eight "bearer companies" in an army corps. The "bearer companies" constitute the first line of medical assistance in the field.

Each "bearer company" consists of three medical officers, viz., one surgeon-major and two surgeons, one officer and 40 non-commissioned officers and men, attached from the Army Service Corps, with 63 horses and 16 waggons all told; and 61 non-commissioned officers and men of the Medical Staff Corps. These non-commissioned officers and men of the Medical Staff Corps are trained in stretcher drill and first aid, also in the formation of "dressing" and "collecting" stations.

Each company has a total of 16 waggons and carts, viz.:
10 ambulance waggons.
1 general service waggon for equipment.
1 general service waggon for stores.
1 general service waggon for army service corps details.
1 cart for forage supplies.

1 cart for tents.
1 water cart.

A surgery wagon, when ordered for service, contains medical stores, and is fitted up with boxes and baskets in which are surgical dressings, appliances, and instruments, cooking utensils, and medical comforts for the wounded. It also contains an operating table, and a tent for surgical service at the "dressing station."

These "bearer companies" take post immediately in rear of the fighting line; and having formed a "dressing station," and there left a staff consisting of:—

1 surgeon-major in command,
1 surgeon,
1 sergeant-major,
1 compounder,
1 sergeant,
1 corporal,
1 bugler,
4 privates, 1 of whom is a cook (together with the Quarter-Master Sergeant in charge of the baggage and supplies, and 2 privates employed as cooks for the company, the officers' servants, and 1 supernumerary who remains in rear of the "dressing station"),—

they move still further forward and form a "collecting station," if possible, just without the zone of infantry fire, where a sergeant is posted with a "field companion" in his charge, and where the ambulance wagons are left, to which are attached five corporals and five privates. Here the "stretcher bearers" are pushed forward in two sections under one surgeon; each section consisting of one sergeant and 16 privates. These give "first aid" and dressings to the wounded, arrest hæmorrhage, give stimulants, water, &c. They collect the wounded, and carry them back to the "collecting station," where they are loaded into the ambulance wagons. The "regimental stretcher bearers" take part in this duty.

The wounded are then conveyed in the ambulance wagons to the "dressing station." Here a more thorough examination of each case is made, and a classification of the various wounds and injuries taken, food, &c. being given. The medical officer then affixes to the clothes of each wounded man a diagnosis "tally," on which is specified his regiment, number, rank, and name, with the nature of his injury, the treatment adopted, and any precautions required as to his transport, the man's name and nature of wound being also entered on the counterfoil of the "tally book." From the "dressing station" the wounded are sent back to the "field hospitals" of the division, which are situated still further in the rear; and at this juncture appears a weak point in our ambulance organisation, from the fact that no supplementary transport is provided from the "dressing station" to the "field hospitals." This very heavy duty has to be undertaken by the ambulance wagons of the bearer company, as a "field hospital" has no ambulance wagons, six of the ten wagons belonging to the "bearer company" being usually taken up for this service. It sometimes happens that the "field hospitals"

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are much delayed, owing to blocks on the lines of communication, in reaching the rear of the army. Under these circumstances, the "dressing station" becomes for the time being a very advanced "field hospital," where the wounded are temporarily attended until the nearer approach of the "field hospitals" to the battle-field permits of their removal.

Let us now deal with the field hospitals which constitute the second line of medical assistance in the field.

These hospitals are mobile, and are stored in wagons. There are 13 such hospitals with an army corps in the field, viz.: 3 with each Division of Infantry, 3 with the "attached Cavalry Division," and 1 with the "Corps Troops"; and each has a staff of two surgeons-major, and two surgeons, one quartermaster, medical staff, and 40 non-commissioned officers and men of the Medical Staff Corps, with 26 non-commissioned officers and men attached from the Army Service Corps with 39 horses, and a total of 11 wagons and carts all told, viz.:—

6 general service wagons for baggage equipment and reserve rations.
1 general service wagon for Army Service Corps details.
1 forage cart for supplies.
1 forage cart for tents.
2 water carts.

Each of these hospitals will accommodate 100 wounded, and they may be divided into halves should occasion require.

In the field, all medical establishments are distinguished, during daytime, by a Red Cross flag, and during the night by a Red lamp between two White ones. Directing Red Cross flags are placed between the "Collecting" and "Dressing" Stations, and between the latter and the "Field Hospitals," to mark the road.

The "stationary hospitals" on the lines of communication, of which there are eight or more, constitute the third line of medical assistance. These will each give shelter to 200 wounded, and in addition to these there are two "general hospitals," both of which are capable of receiving 500 wounded.

One of these "general hospitals" is situated at the base of operations, and is called the "base hospital," usually at a sea port.

Should it be impracticable to form this base hospital on shore, a ship may be utilised for the purpose.

From this place to England, "hospital ships" which are specially fitted and equipped for the transport of the sick and wounded, are running.

During our late wars in Egypt, some of the great steamship companies provided vessels for this purpose.

Much of what I have here stated is the outcome of the training it was my privilege to undergo whilst serving under Surgeon-Major G. T. H. Evatt, M.D., Army Medical Staff, at Quetta, and I have availed myself largely of his experience in the compilation of this paper.

DISCUSSION.

Brigade-Surgeon J. Hector, M.B., said:—As an officer who has long taken a great interest in, and who has had a good deal to do with, the subject of which Surgeon Addison's excellent paper treats, I should like to make a few remarks upon it, and if these partake more of criticism than of eulogy it is not because I do not see a vast deal to admire in our system, but because I think our time here can be better devoted to criticism and suggestion than to laudation.

First, I should like to say a few words about the men of the Medical Staff Corps, who, no matter what assistance we may get from other sources, must always be the backbone of our bearer companies.

Having had the honour to command the Depôt and Training School of the corps at Aldershot, through which all the men and officers joining have to pass for instruction, and having seen these men at work in the field, I have no hesitation in saying that they are second to none in our army in sobriety, good conduct, intelligence, and zeal and devotion in the discharge of their duties; but these good qualities, important as they are, are not all that is wanted to make them efficient; any one who has acted as one of a stretcher detachment will bear me out in saying, that to enable a man properly to take his share in the work of lifting wounded men into and out of a stretcher, into and out of ambulances, and carrying a loaded stretcher, he must be of good physique. The regulations on the subject of recruiting have been framed by wiser heads than mine, but I cannot help thinking that the one which prevents our enlisting a man more than 5 feet 5 inches in height into the Medical Staff Corps, is a mistake.

I agree with Brigade-Surgeon Godwin, that sufficient opportunities are not given to us in peace time to test and practice our arrangements; it seems to me an astonishing fact, that at no station in the kingdom is there a bearer company or field hospital, nor even the smallest unit of these stationed, and it is a fact, that while I commanded the Depôt, on no occasion when flying columns were sent out equipped as for war, to test the efficiency of our system, did any unit, properly horsed and equipped, of these go out with them, and I believe this is true still. I think a fully equipped bearer company and field hospital, or at any rate a unit (say a half one of each), should always be stationed at Aldershot, and go out with these flying columns and to the field days. I hope, too, that the time is not far distant when the whole of the equipment will be handed over to ourselves, and that we shall cease to have to trust to any other corps or department to supply any of it to us. When this is done hitches, such as have occurred before and for which the department has been, I think, unjustly blamed, will, and will then only, cease to occur.

I do not think that sufficient use is made in our army (especially in India), either in peace or war, of wheeled transport. While in charge of the Base Hospital at Kandahar, in 1881, I saw a large convoy of disabled men sent off to the Base Hospital, and all went in dhoolies, though the road they travelled along was not only passable but a very fair one for wheeled transport; and later still, while marching from Chuckrata to Calcutta, the transport of the sick was effected by dhoolies, although a great part of the time we were travelling along the Grand Trunk road.

The importance of clearing the front of an army as quickly as possible of disabled men, and of getting these quickly into a proper

hospital, cannot be exaggerated, and wheeled transport, when it is possible to use it, is the best means to this end; in my opinion, we are apt to underrate the extent to which this can be used, especially now that good field dressings are applied on the field, and when it is possible to take the stretcher, with the wounded man in it, out of the ambulance and carry him in it over very bad parts of the road. I have taken the Woolwich ambulance over a large part of Zululand, and up as far as Secoceoni's country, in South Africa, and a "Hawke's Feeder," as far as Maiwand, in Afghanistan, going over exceedingly bad ground with ease and success; and I should like to see us acting more on the principle that it is possible to take these ambulances, if not *everywhere*, at least *nearly everywhere* a field gun can go; and in few cases, except in mountain warfare, should it not be possible to take them so far to the front as to be within easy reach of the field stretchers.

Now a few words about the surgery and pharmacy waggons. I was the first, I think, to take these (the latter, at any rate) on field service; both are, in my opinion, most excellent vehicles and wonders in the ingenuity shown in getting a large number of useful articles packed into a small space, and in a way which makes them easily get-at-able. We advanced for the attack on Secoceoni's stronghold at 3 a.m., in a bad light, and had to go over some bad ground, and crossing a little ravine the surgery waggon upset, causing some delay, and I am inclined to think that this vehicle when fully packed is a little top-heavy, and therefore wants care in driving.

Four of the pharmacy waggons were sent down from Woolwich to be embarked in the "Euphrates" with us for Zululand, in 1879, and it was decided that two should stand on each side of the quarter-deck during the voyage, and to put them there they had to be hoisted on to the deck; those who had charge of carrying out this operation evidently under-estimated the weight of the first one, for when in mid air the slings gave way and the waggon fell with a crash on the bulwarks of the ship. I was very anxious to see how the contents of the waggon had fared, and so opened it as soon as possible, and was much and agreeably surprised to find that nothing in it had been damaged, proving how well it is arranged and packed inside. One day when we got into hot weather it was reported to me that something had happened to two of the waggons, and I found that a stream of the contents of one of the bottles in each was running on to the deck and staining it terribly, much to the disgust of the First Lieutenant, and we found that these bottles had burst, an accident I attributed to the heat causing expansion in the too-full and capped down bottles; we took the caps off all the bottles and loosened the stoppers a little, and no further accidents occurred; it seems to me, therefore, that in hot weather it would be as well to take the caps off the bottles and to see they are not too full, replacing the caps again, of course, before disembarking the waggons.

Surgeon Morris, M.S., said:—I should like to add my tribute of thanks to Surgeon Addison for the paper he has read before us. As he himself states, there is no original matter in it, but it is merely a compilation of the various ambulance arrangements for an English army corps in the field. They are but slightly different to the general European system of rendering aid to the wounded in the field, and that difference depends principally upon the various conditions of climate and country under which the English soldier fights his battles.

A few points suggest themselves to my mind in connexion with the text Surgeon Addison has given to us, and these I would address to the Congress in its special international character. Experience has taught us that the more we harbour the strength of the soldier in war time by clothing him suitably, and by feeding him well, and by sheltering him as much as is consistent with the necessities and exigencies of war, the more we shall obtain by his services when the time of trial comes; and, thinking of this, I am induced to pass off the beaten track of regulation, and to view some of the results of modern ingenuity tending in the same direction, and to prove that at least one of them is of special interest and worthy of much thoughtful consideration at your hands. I refer to the tented waggon and its appurtenances, generally known as the Tortoise system of tent waggons. This tented waggon, which you may have seen in your own countries, and which, of course, may be seen in London, is now the most international form of ambulance conveyance which exists. Taken up, and more or less adopted by the great nations of Europe, it will, I am certain, prove its value when called upon to do so. A proportion of tents applied to baggage, store, and other waggons of a force on the march would not only protect the stores, but would afford efficient shelter for the soldiers, and protect them from the inclemency of the weather, and in tropical regions reduce considerably the non-effectiveness resulting from malaria. Taking these advantages alone, I would ask, "Should not every ambu-" lance and store vehicle on the lines of medical assistance be provided " with a tent?" For example, there are 10 ambulance waggons with each English bearer company, and, including the transport, 100 men. Five tents on the Tortoise system will suffice to cover these men with the waggon removed, and 10 tents with the waggon remaining; the camp can be struck and pitched in 20 minutes; the men are seldom separated from their waggons, and the whole is included in the smallest and most convenient proportions. Under these circumstances, I would ask, Is it economy to carry tents separately, as is the practice, and to buy, keep up, and feed the transport animals required to convey them?

But not only to the medical establishments in the field is this system applicable, but to every arm of the service in the force engaged.

The amount of transport set free by the adoption of a system such as I have described would pay its initial costs easily in six months, while from a health point of view it is to soldiers a very great boon. The distinguished Baron Mundy, of Vienna, to whom (in common with many other most illustrious medical officers on the continent) I owe so much for their unvarying courtesy to me, when travelling last winter, influenced me very much by his powerful advocacy of the desirability of developing an international character in our ambulance work—that all ambulance material, stretchers, waggons, &c. should be reduced to common measurements, and be completely interchangeable. These questions and their details I submit might be settled by this assembly in Congress. But it is not the work of a year or so, and I would invite you to look forward to the eighth Congress, when those amongst us who are still interested in this matter should be prepared then to more or less definitely settle these questions.

In this latter age, when the fighting machine is well nigh perfect, it behoves us to be prepared for the heaviest duties in connexion with the wounded; and, as military surgeons, let us aim at a high ideal

and develop to its utmost the special nature of our craft, and render to our loved countries and fellow men the best aid and assistance medical science can teach us. Commercial enterprise must not clash with patriotic interest, and the improved line I have indicated must be considered by you. All systems, as well as the "Tortoise," must stand to their trial, and if found wanting must be rejected; but if, on the other hand, human life may be saved, and the misery of war be alleviated or even averted by the adoption of any *one* of them, it should be introduced immediately at all hazard.

Sir K. V. Barrington spoke on two matters, about which he felt strongly after an experience of seven campaigns.

First, as to transport of wounded by road. Nine-tenths of such wounded never saw the inside of a real ambulance waggon, but were carried to hospital in the carts of the country, which are returning from the front after bringing up provisions, ammunition, &c. As a fact, these carts, if prepared with layers of fresh twigs and mattresses, or straw, often formed better ambulance waggons than those specially designed, because the wheels fit the deep rut in the roads, and being generally of very large diameter, they lift the cart more easily over obstacles than the small wheels of ambulance waggons. He had actually removed wounded from a proper ambulance into country carts to save jolting.

Secondly, as to caeolets (litters). He strongly advocated their use in mountainous countries.

Most wounded are hit in the hands and arms, owing to fighting behind entrenchments for example. He had moved seven wounded eight miles on three mules in the Carlist War without suffering to patients. There are never enough surgeons after a battle. He advocated greater powers and latitude being given to our army surgeons to enable them without stint to utilize and adapt the waggons of the country and other improvised means of transport. The claims of the wounded are of paramount consideration, because among them a large proportion are those who have exposed themselves most and have suffered in consequence.

Brigade-Surgeon Staples criticised briefly Sir Vincent Barrington's remarks on ambulance waggons, and pointed out that they were intended absolutely for warfare in the civilised countries of Europe, and that notwithstanding the experience of late campaigns, which were principally in semi-civilised and savage countries, he thought they were still applicable for the purposes for which they were originally intended by their inventors, the French military surgeons of the Revolution. In the meantime, looking to the difficulties of warfare, he quite agreed with the last speaker that the greatest latitude in the irregular or improvised methods of the transport of wounded should be allowed. Mr. Staples then invited the conference to come back to the great questions which were involved in Brigade-Surgeon Godwin's paper—as regards the future position of the Army Medical Service of England. Generally, he agreed with Dr. Godwin's views about the weak points of the present organisation, and, while generally expressing himself as having been an opponent of "rank," he said that under the present organisation it would be a help in enforcing the necessary discipline amongst the subordinate ranks. He then pointed out some difficulties which presented themselves to his mind, chiefly having reference to the effect of Indian service; separating, as this did, for some years, the medical officers from the *personel* of the medical staff corps, and through this separation increasing the difficulty of command on arrival home for service.

Brigade Surgeon Godwin, in reply, said:—The height of bearers being limited to 5 feet 5 inches makes them quite unsuitable for the carriage of tall men. If large men are enlisted large men must be employed to carry them. The use of wheeled carriage must be guided by what may be called national characteristics; if a people are accustomed to carry all burdens on the shoulders or head, this will form probably the best method of carriage, and it will be difficult to introduce wheeled carriage. This was understood by the French in Tonquin, who used chiefly Chinese chairs for the carriage of their sick. Again, if the wheeled carriage of a country differs in the width between wheels materially from that of our ambulance, the native carriage will be best for the wounded. The experience of Sir Vincent Barrington is most valuable. In the name of Sir Thomas Longmore, I wish to say that he would not in any way claim to be the inventor of the word "ambulance." This is a French word, and was introduced by Baron Larrey, and it means the whole field assistance, and not merely a waggon. With reference to rank, which has been touched upon, I think it necessary owing to the duties falling upon medical officers. They must have such status as will enable them to obtain their supplies upon their own authority without being required to get some other kind of officer to countersign their requisition. They are placed by their country in charge of the sick soldiers, and therefore they have a right to expect their demands to be fully met. I beg to echo the sentiment already expressed, that the assistance that medical officers of the English army give to their own men may be interchangeable in sentiment and in kind with that of all the great nations of Europe.

Étude statistique sur le Suicide dans les Armées européennes.

PAR

Le Docteur R. Longuet, Médecin-Major de 1re Classe, au Ministère de la Guerre, France.

Les principales conclusions de ce travail sont les suivants :—

I.—*Fréquence du suicide dans les armées européennes* :—L'armée *autrichienne* vient en tête avec 122 suicides pour 100,000 hommes d'effectif, de 1875 à 1887. Le maximum a été observé en 1886, avec 149 pour 100,000 le minimum en 1878, avec 97. Il faudrait ajouter à cette proportion de 122 pour 100,000, pour être complet, une moyenne de 40 pour 100,000 de tentatives de suicide n'ayant pas abouté. Le suicide est en augmentation, sensible dans cette armée : de 1870 à 1874 : 89 pour 100,000 ; de 1875 à 1880, 112 ; de 1881 à 1887, 131.

Les suicides représentent le $\frac{1}{5}^{e}$ de la mortalité générale de l'armée autrichienne ; il n'est pas d'affection qui y soit plus meurtrière ; la fièvre typhoïde, la pneumonie, et dans certaines années, la tuberculose y causent un chiffre de décès moindre.

Vient ensuite l'armée *allemande* 67 pour 100,000 de 1878 à 1888 On n'avait compté 61 de 1873 à 1878 ; 57 de 1867 à 1875.

D'anciennes statistiques attribuent à l'armée prussienne 50 suicides pour 100,000 de 1829 à 1838, à l'armée saxonne, 64 de 1847 à 1858.

On compte en outre dans l'armée allemande 10 tentatives de suicides pour 100,000.

Armée italienne.—40 suicides pour 100,000 de 1874 à 1889. Contrairement à ce qui a été avancé, la mortalité suicide de l'armée italienne est à peu près stationnaire.

Armée française (intérieur).—29 suicides pour 100,000 de 1872 à 1889.

De 1862 à 1869, on comptait 47 pour 100,000. Cette diminution, qui correspond aux conditions, nouvelles du recrutement, est considérable. En Algérie, l'armée française compte deux fois plus de suicides qu'à l'intérieur 63 pour 100,000 de 1872 à 1879.

Armée belge.—24 suicides pour 100,000 de 1875 à 1888.

Armée anglaise (garnisons de l'intérieur).—23 pour 100,000 de 1882 à 1888.

Aux Indes, le Commandement du Bengale a présenté pendant la même période une mortalité suicide double, 48 pour 100,1000.

Armée russe.—20 suicides pour 100,000 de 1873 à 1889 (1876–1888 inclus) avec maximum en 1882, 31 ; et minimum en 1887, 15, 7.

Armée espagnole.—14 suicides pour 100,000 en 1886.

II.—*Conditions de service, âge, grade, arme :*—Dans les anciennes armées, recrutées surtout par l'enrôlement, dont les cadres étaient entretenus par le réengagement, c'étaient les anciens soldats qui se suicidaient le plus. Il en est encore actuellement aussi dans l'armée anglaise. En France, en Italie, en Allemagne, en Autriche, c'est aujourd'hui le jeune soldat qui cède à l'impulsion du suicide ; en Autriche, il y a, pour ainsi dire, une proportion massive de suicides de jeune soldats dans le premier mois de service.

Les sous-officiers présentent trois fois plus de suicides que la troupe ; les officiers, d'un âge moyen beaucoup plus élevé, trois fois plus.

C'est dans le génie que les suicides sont généralement le moins fréquents ; dans la cavalerie et le train qu'ils le sont le plus.

Les condamnés militaires, dans les prisons et les établisements pénitenciers, se suicident rarement. Il y a, au contraire, de fréquents suicides chez les prévenus, dans les prisons des corps.

III.—*Mode de suicide.*—C'est le coup de feu qui est de beaucoup le plus fréquent ; il compte pour la moitié et même pour les $\frac{3}{4}$ (Autriche) de la totalité des attentats. C'est une proportion quatre fois plus grande que celle offerte par la population civile.

La *pendaison* et *la submersion* sont les deux autres modes les plus fréquents. Il faut noter pour l'armée anglaise la grande fréquence relative du suicide par *cut throat* (gorge coupée, égorgement), suicide inconnu, pour ainsi dire, dans l'armée française, mais qui se retrouve aussi dans l'armée allemande (*Schnitt in den Hals*).

C'est dans l'infanterie que l'usage des armes à feu est le plus fréquent ; dans les armes montées, on recourt plus souvent à la pendaison (avec les cordes à fourrages, la bride, etc. . .) ; dans les prisons, la pendaison est le mode presque exclusif.

Il s'agit presque toujours de coup de feu de la tête. Nos tirailleurs indigènes d'Algérie font exception ; chez eux, c'est presque toujours le tronc que est atteint, l'abdomen ou la poitrine, parfois même le cou, l'épaule, un membre. (Une idée infâmante s'attache chez l'arabe aux mutilations de la tête). Les saisons jouent leur influence sur le mode de suicide ; en été, les suicides ont surtout lieu par submersion.

IV. *Causes du Suicide.*—Dans l'armée autrichienne, le tiers des suicides est attribué à la répulsion du métier militaire ; ce mobile agit avec une bien moindre fréquence dans les autres armées. La crainte d'une punition intervient pour $\frac{1}{3}$ en Autriche et en Allemagne, pour $\frac{1}{5}^{e}$ en France, pour $\frac{1}{7}^{e}$ en Italie. Le suicide passionnel est beaucoup plus fréquent en France ($\frac{1}{5}^{e}$) et en Italie ($\frac{1}{7}^{e}$) qu'en Autriche et en Allemagne. Les affections mentales représentent de $\frac{1}{5}^{e}$ à $\frac{1}{12}^{e}$ de l'ensemble.

V. *Influences générales, race, nationalité, climat, saison, contagion.*—Le classement des armées au point de vue du suicide ne diffère pas de celui des nationalités respectives. L'élément ethnique joue un rôle supérieur à celui des institutions et peut être même des religions. En Autriche (armée), il y a moins de suicides dans les régions de langue Allemande que partout ailleurs. Il y a moins de suicides dans les îles italiennes que dans l'Italie continentale ; moins de suicides en Corse, en Provence, en Gascogne que dans le reste de la France (armée).

L'aggravation du suicide pendant la *saison chaude* est aussi manifeste pour l'armée que pour la population. Le maximum de la mortalité suicide correspond à l'été, le minimum à l'hiver. La courbe du suicide a presque la régularité de celle d'une maladie saisonnière. Le rôle de la chaleur n'est pas moins sensible dans la répartition du suicide par *climats* ; l'armée française de l'Algérie, l'armée anglaise des Indes présentent deux fois plus de suicides que les mêmes éléments de la mère patrie.

L'imitation, ou si l'on veut, la *contagion* s'exerce d'une manière évidente ; dans un régiment, un suicide est fréquemment suivi d'un autre suicide accompli le plus souvent dans les mêmes conditions (série de suicides par pendaison au même crochet d'un couloir des invalides ; plusieurs suicides dans la même guérite au camp de Boulogne). On a compté jusqu'à neuf suicides et une tentative de suicide en un an dans un régiment autrichien, quatre suicides et une tentative dans un même bataillon français en deux ans.

On a donné, relativement à la plus grande fréquence du suicide dans l'armée que dans la population, des chiffres très exagérés, parce qu'on n'a pas pris, le plus souvent, comme base de comparaison, la mortalité-suicide de la population mâle d'un âge correspondant à l'age moyen du soldat. Cependant, en Italie, la mortalité-suicide militaire paraît bien être trois fois élevée que la mortalité-suicide civile (*Mæstrelli*).

En France, la différence, qui a atteint autrefois cette même proportion, est actuellement très faible. L'armée peut avoir des causes particulières, spécifiques, du suicide, mais des mobiles puissants, tenant à l'aprêté de la lutte actuelle pour l'existence, lui sont aussi épargnés.

VI. *Prophylaxie.*—On conçoit que la forte discipline morale et la constante émulation d'honneur que comporte l'éducation militaire parviennent à combattre heureusement la tendance au suicide que le jeune soldat apportait du foyer. La prophylaxie du suicide dans l'armée doit avoir pour base cet objectif élevé :—le perfectionnement moral du soldat obtenu par l'action intime et persévérante des chefs, par l'intervention d'une autorité bienveillante et de conseils opportuns, par les leçons de l'exemple, par l'appel constant au devoir commun, par l'éveil des suprêmes espérances patriotiques.

C'est là un programme sur lequel nous ne pouvons nous appesantir comme il conviendrait, mais dont chaque officier doit trouver de développement dans sa raison et dans son cœur. Il faut nous borner ici à signaler quelques mesures d'ordre matériel destinées à seconder cette œuvre.

Le suicide par coup de feu est beaucoup plus fréquent dans l'armée que dans la population (quatre fois plus en France) ; il est presque naïf de dire que cette prédilection est due à la facilité pleine de tentation avec laquelle le soldat se procure l'instrument du suicide ; on observe que les armes dans lesquelles l'usage des armes-à-feu ne joue qu'un rôle secondaire présentent beaucoup moins de suicides par ce mode. Il ne saurait être question d'enlever au soldat la libre disposition de son arme, mais il serait très-simple de ne le laisser disposer des cartouches dont l'emploi serait sérieusement contrôlé, qu'aux séances de tir, dans des exercices déterminés, en dehors desquelles elles seraient gardées en réserve dans les magasins de compagnie.

Une des plus fréquentes causes du suicide chez les sous-officiers ce sont les irrégularités de comptabilité, le détournement des fonds de la compagnie. Il appartient aux commandants d'unité par une surveillance active, par un contrôle incessant, de mettre leurs subordonnés à l'abri de tout entraînement. Le célibat étant une cause prédisposante au suicide, de plus grandes facilités encore doivent être accordées au mariage des sous-officiers.

Dans certaines contrées de l'Europe, la loi a prescrit de refuser la sépulture au suicidé et de livrer son corps aux amphithéâtres de dissection. On a réclamé l'application de cette mesure à l'armée.* Nous ne nous associons pas à cette requête, qui ne tient pas suffisamment compte des différents degrés de responsabilité des suicidés et qui méconnaît les égards dus au sentiment des familles, déjà si éprouvées, qui inflige en somme au suicide militaire une pénalité qui ne comporte pas la peine de mort appliquée aux criminels de droit commun. Le règlement qui refuse les honneurs militaires au suicide prescrit une sanction plus conforme à l'esprit du milieu militaire et suffisante encore pour l'impressionner. Les chefs ne doivent pas manquer d'en accroître la portée en faisant appel, par la voie de l'ordre, aux sentiments d'honneur et de solidarité de tous les membres de la famille militaire, en flétrissant en justes termes un attentat qui devient, sous l'uniforme, suivant le mot célèbre de Napoléon, une fuite devant l'ennemi.

(*) Elle aurait été appliquée avec succès dans une épidémie de suicide qui décimait un régiment anglais à Malte.

Praktische Durchführung hygienischer Grundsätze im Kriege.

VON

Dr. GROSSHEIM, Generalarzt und Abtheilungschef im Preussischen Kriegsministerium.

In der deutschen Kriegs-Sanitäts-Ordnung vom 10. Januar 1878 ist ein besonderer Theil dem "Gesundheitsdienst im Felde" gewidmet, welcher in kurzer, reglementarischer Form die Hauptgrundsätze für das gesundheitliche Verhalten der Truppen und die nothwendigsten Maassregeln zur Verhütung von Seuchen in kriegführenden Heeren enthält.

Wenn die Truppenführer, die Sanitätsoffiziere und die Beamten der Verwaltung jene Regeln beachten und auf ihre strenge Durchführung halten, so wird ein erheblicher Gewinn nicht nur für die Truppen selbst, sondern auch für die Einwohner des Landes, in welchem sich die Kriegsaction abspielt, erwachsen. Die Sanitätsoffiziere müssen für diese ausserordentlich wichtige Aufgabe, welche ihrer im Kriege harrt, auf das Gründlichste vorbereitet sein, damit sie in ihrem Wirkungskreise sofort die richtigen Maassnahmen vorschlagen oder auch selbst treffen können.

Eine besondere Aufmerksamkeit erfordern die Unterkunftsräume der Mannschaften, ihre Ernährung und ihre Körperpflege. Es wird deshalb, wenn irgend möglich, vor der Belegung eines Ortes mit Truppen über die Gesundheitsverhältnisse desselben eine genaue, ärztliche Nachforschung eintreten müssen, damit Häuser oder Stadttheile, welche der Sitz von epi- oder endemischen Krankheiten sind, unbelegt bleiben; ebenso solche, welche durch ihre Bauart oder Umgebung ungünstige hygienische Bedingungen darbieten. Am besten ist es, inficirte Orte ganz zu vermeiden und lieber Biwaks zu beziehen, als die Soldaten der Gefahr einer Infection auszusetzen.

Wenn es der fortschreitenden Wissenschaft, wie wir hoffen, einst gelingen wird, die Menschen in ähnlicher Weise, wie dies bei den Pocken in so segenbringender Weise der Fall ist, auch gegen andere Infectionskrankheiten durch Impfung zu schützen, so wäre damit auch für die gesundheitlichen Verhältnisse kriegführender Heere ein unschätzbarer Nutzen geschaffen, indessen müssen wir uns jetzt noch bescheiden, diejenigen Wege möglichst abzuschneiden, welche nach unseren bisherigen Erfahrungen die Krankheitskeime dem Körper zuzuführen geeignet sind. Ein solcher Weg und Träger von Krankheitserregern ist in erster Linie das Trinkwasser.

Diesem muss deshalb der Hygieniker vor allen Dingen sein Augenmerk zuwenden. Dazu ist es erforderlich, dass er auch im Felde die Geräthe und Hülfsmittel zur Hand habe, welche ihm Aufschluss über die Beschaffenheit des Wassers geben können. Die *chemischen* Reagentien und Untersuchungsgeräthschaften müssen überall leicht zur Stelle sein, desgleichen ein Chemiker, welcher die Untersuchung vorzunehmen im Stande ist. Dies wird in Deutschland dadurch erreicht, dass die Sanitätsdetachements, bei welchen sich auch ein mit

der Untersuchung vertrauter Apotheker befindet, mit Wasseruntersuchungskasten versehen sind. Aber auch die noch viel wichtigere *bakteriologische* Untersuchung verdächtiger Trinkwässer muss im Felde ausgeführt werden. Zu diesem Zwecke ist ein bakteriologischer Kasten nothwendig, welcher mindestens alle Geräthe für die Wasseruntersuchung enthalten muss. Ein solcher Kasten, welcher übrigens auch noch für andere bakteriologische Untersuchungen ausreicht und sehr leicht von Ort zu Ort mitgeführt werden kann, ist von der deutschen Militär-Verwaltung construirt und gewiss noch denjenigen Herren in Erinnerung, welche ihn im vorigen Jahre bei Gelegenheit des X. internationalen Aerztecongresses in Berlin in Augenschein genommen haben. Derselbe hat die Gestalt und das Aussehen eines kleinen Reisekoffers, damit er von dem mit bakteriologischen Untersuchungen beauftragten Sanitätsoffizier ohne Weiteres als Handgepäck im Eisenbahnwagen untergebracht werden kann. Sein Inhalt besteht im Wesentlichen aus sterilisirten Reagensgläschen (zum Theil schon mit Nährböden gefüllt) und Erlenmeyer'schen Kolben in ausreichender Zahl, dazu Platten und Doppelschalen, Färbemittel, Material zur Herstellung von Nährböden, Sublimat zur Desinfection, Spirituslampe, Pipetten, Platinstäbe, Zählplatte u. s. w.

Ausser diesem kleinen Handkasten ist aber in neuester Zeit noch ein grösserer Kasten von der Medicinal-Abtheilung des Preussischen Kriegsministeriums eingerichtet worden, welcher in einem immer noch verhältnissmässig kleinen Raum alle auch zu eingehenderen bakteriologischen Untersuchungen erforderlichen Gegenstände birgt und in der That ein fliegendes bakteriologisches Laboratorium darstellt. Er enthält eine grössere Menge der Geräthe, Reagentien, Färbemittel u. s. w. des vorerwähnten kleinen Kastens, dann aber einen vollkommenen Sterilisirungs- und Trockenapparat, Teller zur Herstellung einer feuchten Kammer, Thermometer, Pipetten, Fuchs'sche Lampe, Fleischextract, Agaragar u. s. w. Ein vortreffliches Microscop wird in einem aus starkem Leder gefertigten Futteral in handlichster Weise mitgeführt. Es ist mit dieser Ausrüstung die Möglichkeit gegeben, auch unter den schwierigen Feldverhältnissen umfangreiche Untersuchungen vorzunehmen, Krankheitsursachen zu erforschen und ihre Quellen festzustellen. Eine Untersuchung auf Typhus- oder Cholerabazillen gestattet jener Kasten beispielsweise ohne Weiteres. Von welcher Wichtigkeit das im Felde sein kann, liegt auf der Hand.

Die zahlreichen Einzeltheile sind in dem Kasten in zweckmässigster Weise unter grösster Raumausnützung verpackt und der ganze Kasten ist ungeachtet seines reichen Inhalts von 2 Männern leicht zu tragen und mit jedem Wagen zu transportiren. Robert Koch, unser grosser Bakteriologe, hat der Construction desselben, bei welcher auch Professor Statsarzt Dr. Pfuhl wesentlich betheiligt war, seine dankenswerthe Mitwirkung zugewendet.

Wenn ausser dem Trinkwasser, auch der Beschaffenheit des Bodens, der Nahrungsmittel, der körperlichen Reinlichkeit des einzelnen Mannes und seinen allgemeinen Lebensverhältnissen die sorgsamste Aufmerksamkeit zu Theil wird, so kann wohl eine wesentliche Beschränkung der

Krankheiten erwartet werden. Hat doch schon die Sanitätsgeschichte des Krieges 1870–71, welche von der Medicinal-Abtheilung des Preussischen Kriegsministeriums jetzt in ihrem vollen Umfange zur Darstellung gebracht ist, das ausserordentlich bemerkenswerthe Ergebniss aufzuweisen, dass, entgegen den Erfahrungen aus früheren Kriegen, weniger Mannschaften durch Krankheiten als durch Verwundungen dem Tode zum Opfer gefallen sind. Erwägen wir weiter, dass während des Kriegsjahres 1870–71 die Mortalität bei den deutschen Heeren (abgesehen von Todesfällen in Folge von Verwundungen) der Friedensmortalität gleich gewesen sein würde, wenn nicht die Infectionskrankheiten Typhus, Ruhr und in geringem Grade auch die Pocken die Mortalitätsziffer gesteigert hätten, so liegt darin eine doppelte Aufforderung, diesen Krankheiten, die wir zu den vermeidbaren rechnen müssen, mit allen zu Gebote stehenden Mitteln der Wissenschaft entgegenzutreten.

Zu diesen Mitteln gehört auch die Vornahme energischer und zielbewusster Desinfectionsmaassregeln auf allen Heeresstrassen und in allen von der Armee betretenen Gebieten. Bei der Auswahl der Desinfectionsmittel darf nur der eine Zweck ins Auge gefasst werden— sichere Vernichtung der Krankheitskeime. Welche Mittel dazu am geeignetsten sind, möchte ich bei dieser Gelegenheit nicht näher erörtern. Ihre Anwendung muss besonders organisirten Desinfectionscolonnen unter sachverständiger Leitung speciell in der Hygiene ausgebildeter Sanitätsoffiziere erfolgen. Je einfacher sich die Technik hierbei gestalten lässt, desto gesicherter erscheint der Erfolg!

DISCUSSION.

Dr. Kirchner, Surgeon-Major, Prussian Army, Hanover, sagte:— Zu den Ausführungen der Worte des Herrn Generalarztes Dr. Grossheim möchte ich mir einige Bemerkungen erlauben, welche sich auf die Untersuchung von Wasser im Felde beziehen. Das Wasser, der Quelle entronnen, vermehrt seine Keime sofort, sobald es an die Luft kommt und höheren Temperaturen ausgesetzt ist. Man kommt daher, wenn man das Wasser nicht an Ort und Stelle untersuchen kann, zu falschen Resultaten. Ein Wasser, das vielleicht 100 Keime in 1 enthält, kann nach einigen Stunden schon Tausende und aber Tausende von Keimen enthalten. Um die sich daraus ergebende Fehlerquelle zu vermuten, hat man empfohlen die Gelatinplatte an Ort und Stelle zu giessen und zur Untersuchung an den Ort zu senden, wo sich das Laboratorium befindet. Dies schlägt Franck in Wiesbaden vor. Allein meiner Ansicht nach empfiehlt sich dieser Vorschlag nicht. Viel zweckmässiger ist es, das Wasser in Eis verpackt zu versenden. Im Eis verfallen die Bakterien in eine Art von Kältestarre, welche die Vermehrung ausschliesst. Professor Ritsch in Marseille und Oberstabsarzt Dr. Pfuhl in Cassel haben fast gleichzeitig hierzu geeignete Apparate angegeben. Der Apparat von Pfuhl besteht aus einer Anzahl von Glasröhren, die bei Glühhitze (300° Celsius und mehr) luftleer gemacht zu einem engen Stabe ausgezogen und zugeschmolzen sind. Will man Wasser untersuchen, so wird der Stab mit absolutem Alkohol abgewaschen, die Spitze erhitzt und

in die Wasserquelle gehalten. Dadureh brieht die Spitze ab und das Wasser stürzt in das Glas hinein. Nun wird abgetroeknet und zugesehmolzen. Die Röhren werden in Blechmuffen verpaekt und diese in einen Kasten gethan, der mit Eis gefüllt ist. Mit dem Eis wiegt die Holzkiste, in welehe der Bleehkasten gesteekt wird, nieht einmal 5 Kilogramm. Kommt das Wasser selbst naeh Tagen im Laboratorium an, so findet man, dass keine Bakterienvermehrung stattgefunden hat. Früher fand ieh bei meinen zahlreiehen Untersuehungen von Wasser auswärtiger Garnisonen stets sehr viele Bakterienkeime, viel mehr als ieh erwarten durfte. Seit Einführung der Pfuhl'sehen Apparate erhalte ieh an Ort und Stelle dieselben Resultate wie in meinem Laboratorium in Hannover, ein Beweis, dass die Bakterien auf der Reise sieh nieht vermehrt haben. Ieh kann die Einführung dieser Apparate in die Friedens-und Kriegspraxis nur warm empfehlen. Nur so wird die so wiehtige bakteriologisehe Trinkwasseruntersuehung noch den erforderliehen Grad von Zuverlässigkeit haben.

Note sur les Avantages des Attelles en Zinc revêtues de Tourbe rendue antiseptique dans le Traitement immédiat et provisoire des Fractures et pour l'Immobilisation des Membres blessés ou contusionnés.

PAR

le Dr. Jules Félix,

Délégué du Gouvernement Belge et Chirurgien de l'Hospice Ste. Gertrude à Bruxelles.

L'immobilisation des membres est d'une importance capitale dans la chirurgie des armées : les fractures, les entorses, les contusions, les plaies graves avec ou sans hémorragies, même les plaies opératoires nécessitent très fréquemment l'immobilisation immédiate et méthodique des membres. L'attelle joue donc un très grand rôle dans la chirurgie de campagne, et je crois pouvoir affirmer que les attelles, les bandes et la charpie antiseptiques constituent la plus grande et la plus importante partie de l'attirail chirurgica de première ligne.

Aussi les modèles différents d'attelles sont considérables ; on en a fait de toutes les formes, en bois, en carton, en métal, en gutta-percha, etc.

Les chirurgiens de toutes les nations se sont préoccupés des divers systèmes d'attelles, et je rappellerai volontiers ici, combien les chirurgiens belges, le Baron Scutin, le Dr. Van Hoeter, le Dr. Merchie qui ne sont plus, les Professeurs Burgrave de Gand, le Professeur de Roubaix, le Dr. Hermant de Bruxelles, et bien d'autres ont contribué aux progrès de cette partie si importante de la chirurgie conservatrice. Dans la chirurgie de campagne et surtout dans celle de première ligne, sur le champ de bataille ou sur le lieu d'un accident grave, les moyens de premier secours, pour être efficaces, doivent être prompts, simples et

faciles à appliquer. Les appareils doivent être aseptiques ou antiseptiques; occuper le plus petit volume et avoir le poids le plus léger pour être d'un transport facile et pouvoir être amenés sur place en quantité la plus considérable possible. Une autre condition, qui ne gâte rien et dont on devra toujours tenir compte, c'est le prix peu élevé et la confection facile des objets de pansements provisoires et immédiats.

Je crois, Messieurs, que le modèle d'attelle en zinc que j'ai fait confectionner et que j'ai l'honneur de vous présenter, réunit la plupart de ces conditions et peut être par conséquent d'une assez grande utilité. Cette attelle est tout simplement une bande de zinc (No. 10 ou 11) de trois centimètres de largeur et de toute la longueur des feuilles de zinc qui ont dans le commerce une longueur de un à deux mètres cinquante centimètres; la dernière longueur, 2 m 50, me paraît la meilleure. Cette bande de zinc (de 3 centimètres × 2m 50) est revêtue de tourbe antiseptique, formant coussin, et maintenue par de la gaze antiseptique. Cette attelle est d'une très grande légèreté, très maniable, facilement transportable parce qu'elle se roule aisément en paquets de poids et de volume uniformes, faciles à emmagasiner pour le transport.

L'attelle est donc préparée d'avance; son application, grâce au coussin de tourbe rendue antiseptique ou aseptique, qui fait corps avec elle, est immédiate; le chirurgien ou l'infirmier qui relève un blessé n'a d'autre soin préliminaire que de la couper au moyen de cisailles, à la longueur voulue pour chaque cas spécial; s'il doit augmenter la largeur de surface, il lui suffit d'en appliquer une deuxième ou plusieurs les unes à côté des autres et de les maintenir par une bande roulée; donc facilité et célérité dans l'application.

Un autre avantage, c'est que les deux attelles pour le membre supérieur ou inférieur ne doivent pas être distinctes; la bande en zinc reste d'une pièce et en la recourbant sous la plante du pied ou au niveau du plis du coude, elle forme étrier et se maintient beaucoup plus aisément. La malléabilité et la flexibilité du zinc (No. 10) permet de plier à volonté l'attelle au niveau des saillies osseuses, sans nuire à sa rigidité, au contraire.

Le poids de mon attelle est relativement minime: il est d'environ deux cents grammes par mètre courant; son volume est très réduit, ce qui permet le transport facile d'une très grande quantité d'attelles; cent mètres courant d'attelles ne pèsent que vingt kilos et peuvent être enfermés dans une petite caisse.

On voit d'ici tout l'avantage qui en résulte sur le champ de bataille ou en cas d'accidents graves de chemin de fer ou autres.

DISCUSSION.

Médecin-Major Schneider, Paris, dit qu'il est complètement d'accord avec M. Félix sur la nécessité d'avoir d'avance des moyens d'immobilisation pour les fractures de guerre. Cela existe du reste dans les approvisionnements militaires en France, en Allemagne, etc. Il admire beaucoup l'attelle présentée par M. Félix qui est d'un emploi très commode.

Il insiste cependant sur la néecssité de rendre la tourbe *aseptique.*

Il croit en effet que provenant de la terre, elle doit contenir divers microbes et notamment le vibrion septique, et qu'il est indispensable de l'aseptiser. Ensuite, comme elle est imputrescible, on pourra l'employer sans inconvénients.

Dr. Félix dit, en réponse à l'observation très exacte de M. le Dr. Schneider, que des expérienees ont démontré que la tourbe n'est pas par elle-même aseptique ni antiseptique, et qu'elle contient des mierobes, même pathogines ou qu'elle en favorise le dévelopement. Je reconnais parfaitement la vérité de l'assertion du Dr. Schneider, aussi j'ai voulu exprimer simplement que la tourbe doit être rendue aseptique au antiseptique par les procédés ordinaires avant de s'en servir en chirurgie.

Ein Fall von Blitzschlag.

VON

Dr. Scheibe, Stabsarzt im Konigl. Preussischen Kriegsministerium, Berlin.

Dr. Scheibe giebt eine kurze Beschreibung eines sehr interessanten Falls von Blitzschlag, welcher sich am 9. Juni 1891 in der Nähe von Berlin zugetragen hat. Dieser Fall konnte, da er unmittelbar nachher in militärärztliche Behandlung kam, genau verfolgt werden. Es wurden sofort verschiedene photographische Aufnahmen davon gemacht, die den Herren Mitgliedern der VIII. Section auf Verlangen von Berlin übersendet werden.

The Dietary of Troops.

BY

Lieut.-Colonel A. T. Wintle (late R.A.).

We are justified in adopting as an axiom that the daily ration of food issued by the State to the soldier should be sufficient for the work he may be called on to perform, and should be provided at the least cost possible.

The present daily ration on home service consists of 1 lb. of white bread and 1 lb. of meat exclusive of bone.

That this is not generally considered sufficient is proved by the fact that the soldier has to pay at least 3*d.* a day for extras of sorts *out of his own pocket.*

Is it possible to issue a ration sufficient for all requirements so as to save this personal expenditure, and without increasing the outlay on the part of the Government?

I think it is, if we go direct to the first source of food, viz., the vegetable kingdom, instead of obtaining it second-hand through the medium of animals.

Meat consists of about three-fourths of water. At 7½*d.* a lb. it will cost about 2*s.* 6*d.* a lb. for dry food, while wheat and other grains, like beans, peas, &c., in their natural state only contain about 14 to 15 per cent. of water. 1 lb. of these, at prices varying from 1½*d.* to 2½*d.* per lb., will only cost from 1¾*d.* to about 3*d.* a lb. for dry food; oatmeal, which has only about 5 per cent. of water, would be about the same price, and as it has been proved that the Canadian Trappers thrive on a ration of 2½ lbs. of maize daily in a very cold climate, it will readily be seen that, as far as cost is concerned, the advantage is in favour of vegetable diet.

The next question to be considered is, whether the soldier could perform all his duties on a purely vegetable diet?

Historians have told us that the Greeks, in the time of their early and most successful career, owed much of their physical strength and endurance to their simple diet of wheaten bread and other produce of the soil; their athletes when training were fed on dried figs, nuts, coarse bread, and soft cheese, and were absolutely forbidden to use wine. In later times, after animal food was given, it was soon found that it made them the most sluggish and stupid of men. The immortal Spartans were from infancy nourished on the simplest and coarsest vegetable food. Cyrus and his conquering army subsisted on vegetable food and water. The Roman army in the period of their greatest valour subsisted on a plain vegetable diet, and their athletes were trained on barley; and as the army became less temperate and simple in their diet they became less brave and less successful in arms.

About the sixth century B.C. Confucius in China, Buddha in India, Zoroaster in Persia, Pythagoras in Greece, and Mancho Pacca in Mexico founded their teachings on a basis of a non-flesh diet.

Travellers in more recent times have told us of the strength and robustness of the Egyptians;—of the postal runners in India, in 1818, who used to travel from Bombay to Calcutta in 25 days at the rate of 62 miles a day, their height being from about 5 ft. 10 in. to 6 ft.;—of the Chilian miners, who used to carry loads 200 lbs. in weight up 80 perpendicular yards 12 times a day;—of the natives of Sierra Leone, who live in a climate said to be the worst on earth, who are very temperate, and live as long as men in the most propitious climates; of the Turk, who has always proved himself to be endowed with singularly strong vitality and energy; as a member of a warlike race he is without equal in Europe in health and hardiness; he can live and fight when soldiers of any other nationality would starve, and can bear the greatest hardships and exist on the scantiest and simplest food;—during the Crimean War it was found that his wounds healed much more

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readily than those of our men;—all these subsist on a vegetarian diet; of the Russians, some of them 80 and 90 years old, who worked 16 to 18 hours a day, and were full of agility, vivacity, and even hilarity, on a piece of black bread weighing about a pound and a handful of garlic; of the Norwegians, whose general food is rye-bread, milk, and cheese, who are remarkably robust and healthy, and live to great age; of the Laplanders, who, living on flesh, are a diminutive race, while the Finns, *who inhabit the same climate*, but live chiefly on the products of the soil, are as fine a race as the Swedes and Norwegians.

Of the Syro-Arabian nation Baron Larrey says:—"The heads of "this race display in other respects the greatest physical perfection, a "most perfect development of all the internal organs, as well as those "which belong to the senses," and that experience has proved to him that their intellectual perfectibility is proportional to this higher development of physical organisation, and that it is, *without doubt*, superior to the faculties of those nations who inhabit the northern regions of the globe, *i.e.*, the Europeans. "In Egypt," he says, "we "have observed that young Arabs of both sexes imitate all the pro- "ductions of our articles and artisans with astonishing fidelity, and "that they also acquire languages with equal ease." . . . "They "are supplied with very white regular teeth; the *canines especially* "*project but little.* We have noticed," he says first, "that the con- "volutions of the brain, whose mass is in proportion to the cavity of "the cranium, are more numerous, and the furrows which separate "them are deeper, and the matter which forms the organ is more dense "or firmer than in other races; secondly, that the nervous system, "proceeding from the medulla oblongata and the spinal cord, appears "to be composed of nerves more dense in structure than are those of "Europeans in general; thirdly, *that the heart and arterial system* "*display the most regularity*, and a very perfect development; fourthly, "that the external senses of the Arabs are exquisitely acute and "remarkably perfect; *their sight is most extensive in its range; they* "*hear at very great distances*, and can *through a most extensive* "*region perceive the most subtile odour.*" The muscular or locomotive system is strongly marked; the fibres are of a very deep red colour, firm and very elastic; hence the great agility of this people. Their physical perfectibility is very far from being equalled by the mixed nations of a part of Africa and of America, and especially by the northern nations of Europe. "Upon the whole," says Baron Larrey, "I am convinced that the cradle of the human family is to be found "in the country of this race; *they eat little and seldom of animal* "*food.*"

The English seem always to have been the largest meat eaters, and when meat was sold at $\frac{1}{2}d.$ a lb. in the reign of Henry VIII., according to Froude, "invariably by friend and enemy alike, the English are described as the fiercest people in all Europe (the English wild beasts, Benvenuto Cellini calls them)." In 1685 the majority of the nation lived almost entirely on rye, barley, and oats.

Adam Smith, in his "Wealth of Nations," 1776, says, "That "experience taught that grain and other vegetables, with the help of "milk, cheese, butter, or oil, afford the most plentiful, the most whole- "some, the most nourishing, and the most invigorating diet;" and that the men that did the hardest work in his time, as chairmen, porters, and coalheavers, were most of them from the Irish peasantry; and that those who had continued their vegetable diet were the strongest men in the British dominions.

This has been confirmed by Dr. Forbes, of Edinburgh, who instituted some experiments with a view of testing the relative height, weight, and strength of some 800 students aged about 25 years, and he found that the more carnivorous Englishman was surpassed in height, weight, and strength by the frugal and abstemious Scotchman; he again being surpassed by the simply-fed Irishman. Dr. Edward Smith found that our labouring population, and Dr. Guy that our soldiers in hospital, throve in proportion to the cheapness of their food.

A report upon the alimentation of agricultural labourers in Europe, taken by order of the English Government about 1871, gives the dietaries in use amongst the working populations of various countries, and shows that the peasants and agriculturists are almost wholly vegetarians in practice; in England alone do we find animal food forming part of the daily food of the lower classes, and this only within about the last 35 years, and already they are beginning to degenerate.

About two years ago the "Bicycling News" reported that, in a 24 hours' ride, the longest distance ridden on an ordinary bicycle was by a vegetarian.

In another instance, one who won honours at Cambridge has succeeded in doing 200 miles in one day on the same diet, and trainers have already commenced advocating the diet in preference to any other.

The celebrated Lord Heathfield, who defended Gibraltar during the siege, and who was well known for his hardy habits of military discipline, neither ate animal food nor drank wine; his constant diet being bread and vegetables, and his drink water, and he never slept more than four hours in the 24. Another well-known man was the eminent Army Surgeon Jackson, who said, "My health has been tried in "all ways and climates, and by the aids of temperance and hard work, "I have worn out two armies in two wars, and probably could wear out "another before my period of old age arrives. I eat no animal food, "drink no wine or malt liquors, nor spirits of any kind. I wear no "flannel, and regard neither wind nor rain, heat nor cold, when "business is in the way."

Benjamin Franklin concluded by trials that a vegetable diet promoted clearness of head and quickness of perception. He said, "That Irish boys are clever only so long as they are kept on the simple "food of the peasantry, but become dull and stupid when fed on flesh "meat."

Newton wrote his great work on optics on a non-flesh diet.

Byron realised the effects of eating flesh as regards brainwork, and is said to have written "Don Juan" on a mixed diet, and "Childe Harold" on a biscuit diet.

Shelley also practised and wrote a powerful essay on the advantages of a vegetable diet.

Count Rumford at the end of the last century conducted for a period of over five years the most exhaustive experiments that have ever been made as regards nutriment and cooking in his attempt to discover the best way of feeding the poor of Munich. He found that the *cheapest, most savoury, and most nourishing* diet that could be provided at a cost of a little over 1*d.* a day, was a soup composed of pearl-barley, peas, potatos, cuttings of fine wheaten bread, vinegar, salt, and water in certain proportions.

In the Parliamentary Report on Prison Dietary, dated 18th March 1878, the Committee, in commenting on "the outer envelopes of the "seed of wheat, say *they are all much richer in nourishing properties,* "in *nitrogen, oil,* and *mineral matters* than the central or floury portions "of the grain. The flesh-formers in white bread amount to 7 *or* 8 *per* "*cent.*, in bread containing the envelopes they amount to 10 *per cent.* "Experiments have proved that animals can live upon brown bread without "any other food; but if fed upon white bread alone the health first suffers, "and death finally ensues;" and they quote Dr. Brunton as saying, "Brownish bread of simple wheatmeal, with even an admixture of a "fourth or a fifth of rye, would, for equal money, give the labouring "population a food incomparably more abundant and nutritious than "that which they now make use of as pure white bread." Then they give "the estimated cost, at present prices, of various articles of food "required for raising the body of a person weighing 10 stone to a "height of 720,000 feet:—Split peas, 13*s.*; oatmeal, 14*s.* 5*d.*; flour, "18*s.*; bread, 18*s.*; cheese, 2*l.* 3*s.* 3*d.*; fish, 4*l.* 6*s.* 6*d.*; beef, 6*l.*," and continue, "We are of opinion that leguminous seeds or pulses should "form a prominent feature of prison diets. The chief pulses are the "pea, the haricot bean, and the lentil; these seeds possess a very high "nutritious value. There would be no difficulty in constructing a diet "containing nutritious principles equal to those of meat out of oatmeal, "peas, beans, and fats, and this could be done at a third or a fourth "of the cost incurred by depending entirely upon the animal kingdom "for these alimentary products. Even at present prices we would "strongly recommend the frequent substitution of haricot beans and "bacon for beef as a change," and they give the relative costs of "the "present beef dinner twice a week" and of a bean dinner:—

	d.
4 oz. of beef (cooked) without bone (7 oz. of beef with bone, at 7½*d.* per lb.)	3½
12 oz. potatoes	¾
8 oz. bread	½
Total	4¾

and the beans and bacon dinner :—

	d.
9 oz. of haricot beans - - - -	½
1 oz. of cooked fat bacon - - -	½
12 oz. of potatoes - - - - -	¾
8 oz. of bread - - - -	½
Total - - - - -	2¼

And they continue, "The bean dinner is superior in nutritive value to "the beef dinner, while, as will be seen from the above, its commercial "value is about 2½*d.* less."

Another point to be taken into consideration is the diseased state of so many of the cattle killed. Dr. Carpenter stated publicly a few years ago that he had been informed by an inspector of one of the cattle markets that 80 per cent. of the cattle slaughtered for the London market were diseased, and that the supply would fail if they were excluded. Is it possible for stall-fed animals, overburdened with fat, to be healthy under any conditions? In the first six months of this year 150,000*l.* were paid in the way of compensation for slaughtered animals. Again, it seems necessary for all flesh-eaters to eat vegetables and salt to counteract certain effects caused by eating meat. Inspector-General C. A. Gordon, writing on this point some years ago, said, "The importance of "vegetables as part of the dietary of the soldier is much insisted upon "by the American Sanitary Commission," and he quotes the Commission as saying, "We find, in the absence of a vegetable diet, a cause for the "greater part of the mortality of our troops, both after the receipt of "wounds and from disease, and we fully believe that one barrel of "potatoes per annum is, to the Government, equal to one man."

On the other hand, Dr. Carr, who in 1847 wrote of the necessity of brown bread for digestion, nourishment, and sound health, and of the injurious effects of white bread, says, "Near the close of the last "century, owing to a scarcity of provisions, 80,000 English soldiers "were fed on *meal* bread, and such were its effects that the officers and "physicians of the army declared the soldiers were never so healthy "and robust, and that disease of every kind had almost disappeared from "among them."

The only public institution in England where a vegetarian diet has been tried is the "Boys' Home, Southwark," the superintendent of which wrote in June 1889: "Our system . . . . . "of non-flesh diet has proved so successful that we never think for a "moment of going back to the old *régime*. I am sure that, if wisely "and thoughtfully introduced into any institution for young people, it "will be found of advantage, both physically and morally. We have "never had anything like such good health before as in the last three "years. This is wonderful, considering the stock and antecedents "of our boys."

Already vegetarian dishes have been introduced into the dietary of the troops at Aldershot, and have apparently given satisfaction; and if

lectures were given to the troops showing the chemical value of vegetable foods as compared with meat, they would be then prepared for the inevitable changes which will take place in course of time.

As we are indebted to the medical officers of the armies and navies for the initiative steps taken early in the century in the matter of hygiene, and as they are peculiarly situated for carrying out all *legitimate* experiments tending to the highest development of the physical, intellectual, and moral nature in man, and as the mantle of the Church seems destined to fall on the shoulders of hygienists sooner or later, we are justified in hoping that they will always strive for the *highest* ideal, and, acting accordingly, will eventually command success.

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